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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

ELECTRICITY AND MAGNETISM,

THEIR

GENERATION AND APPLICATIONS.

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INDEX OF NAMES.

[The names of persons by whom inventions have been communicated from abroad, when known, are printed in *Italics*. The Roman numerals refer to the Introduction.]

PREFACE AND INTRODUCTION.

PREFACE.

THE Indexes to Patents are now so numerous and costly as to be placed beyond the reach of a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Subject-matter, Reference, and Alphabetical Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the latter are sold have been added.

The following rules have been adopted in deciding which Specifications belong to this series of inventions:—

1st. To include all Specifications in which mention is made of electric or magnetic force as applicable in carrying out the invention.

2nd. To include all which depend on electric or magnetic science, whether such dependence is mentioned or not.

3rd. To exclude those in which no mention is made of their application to electric or magnetic purposes, although it may be somewhat evident that such application might be made. For instance, as in the Specification of Letters Patent, No. 6896 (Old Law), no mention is distinctly and directly made of the application of gutta percha to the

coating or covering of wire for electrical purposes, it is not included in this series, although such an application of the invention is evident.

4th. To exclude all those in which no other allusion to electric or magnetic science is made than the word "galvanized," as applied in the ordinary process of zincing iron.

In all cases in which a reasonable doubt exists as to whether an invention is to be included in this series or not, the abridgment is included, and the cause of doubt stated.

In making the abridgments of Specifications of mechanical applications of electricity and magnetism, the rule of tracing their operation from the prime mover to the result has been observed, when possible. A similar rule has been observed with reference to electro-chemical processes. The course of the electric current from one battery pole to the other, through the work to be done, has been traced in all cases in which such a method of treating the subject could tend to clearness of description. When the complicated nature of the subject requires it, each description is begun by a short summary of the whole action of the machine or process treated of.

All the quotations from the printed Specifications (included between quotation commas throughout the work) are given in the exact punctuation and orthography therein used; however, to draw attention to any passage more immediately connected with this sèries of abridgments, portions are sometimes italicised that appear in Roman type in the original.

Care has been taken to preserve correctness in the use of the scientific terms occurring in the work, a caution rendered necessary by the frequent misappropriation of terms by inventors. The word spiral, for instance, is frequently used instead of helix, isolate for insulate, aluminium (the French name) for aluminum, &c. &c. To avoid misunderstanding in regard to the meaning of terms which some

patentees appear to consider synonymous or doubtful, the following definitions are given :—

BRAKE, an apparatus used to stop rotation, or other mechanical movement, by the friction of surfaces. (See *Practical Mechanic and Engineers' Magazine*, October, 1843, pp. 25–27, December, 1843, pp. 98, 99, and April, 1844, pp. 258, 259.)

BREAK, a commutator, or apparatus to interrupt or change the direction of electric currents. (See *De la Rive's Treatise on Electricity*, Vol. I., p. 377.)

HELIX, a screw-form curve. A curve generated by winding an inclined plane round a right cylinder; this curve is necessarily not situated in one plane, as all its points lie on the surface of a cylinder, and therefore at equal perpendicular distances from the cylinder's axis, the said perpendicular uniformly increasing in height above the base of the cylinder. According to another definition, it is the curve formed by a straight line twisted round a cylinder, so that the perpendicular distance between each convolution is a constant quantity. It may also be defined as "the curve of double "curvature formed by a thread, wrapped round the surface "of the cylinder, so as always to make the same angle with "the axis." This term is used to name the curve formed by the winding of the external protective wire round electric telegraph cables; it also applies to electro-dynamic coils, to springs that act by tension in the direction of their axes, and to other similar arrangements. (See *Encyclopædia Metropolitana*, Integral Calculus, Part III., pp. 143, 144; also *Library of Useful Knowledge*, Differential and Integral Calculus, pp. 396, and 415–417.)

INSULATE, to separate, electrically speaking, or to surround with a non-conducting body; this term is used in reference to an electrified body which it is desired to preserve in that state. (See *Dr. Golding Bird's Natural Philosophy*, p. 162.)

ISOLATE, to separate or detach; this word has no express meaning in the electrical vocabulary. (See *Maunder's Treasury of Knowledge*, Dictionary in Part I.)

PALL, a click that falls by its own weight into the teeth of a toothed or ratchet wheel. (See *Practical Mechanic and Engineers' Magazine*, April, 1844, p. 251.)

SPIRAL, a curved line situated in one plane, and generated as follows:—A straight line of indefinite length moves round a fixed point and from a fixed line passing through the point; a point also moves along the moving line, starting from the centre or fixed point at the same time that the line commences its motion; the point will trace out a curve commencing from the centre and extending through a series of turnings gradually outwards, which curve is a spiral. It may also be defined as the curve formed by twisting a straight line round a fixed point, so that the distance between each convolution, radially, is a constant quantity. Mathematicians recognize several distinct kinds of spirals, each having its own characteristic properties. This term is used to name the springs that are in one plane, and act by unwinding a barrel, such as the main spring of clocks and watches, &c.; it is also applicable to flat electro-dynamic coils commenced upon a core and proceeding outwards by convolutions in one plane. (See *Library of Useful Knowledge,* Algebraical Geometry, pp. 193–195, Differential and Integral Calculus, pp. 356–358, and Practical Geometry, pp. 118, 119; also *Hind's Differential Calculus,* pp. 262–285; also *Encyclopædia Metropolitana,* Integral Calculus, Part III., pp. 136, 137.)

Berzelius' ammonium theory has been adhered to throughout the text of the work, and the best recognised names for chemical and metallic bodies, such as platin*um*, alumin*um*, ammoni*um*, have been adopted.

When two words are used as one adjective to qualify a noun, they are connected by a hyphen, thus:—"line-wire circuit," in contradistinction to "local circuit," &c.

In an Appendix will be found the abridgments of eleven Specifications omitted from the body of the work, but which are duly recorded in the Indexes.

In the title and introductory part of these Abridgments the word "generation" is employed as the equivalent of the various expressions, "producing," "exciting," "induc-"ing," or "developing."

Under the word "electricity" is included statical, frictional, or tension electricity, steam electricity (or hydro-elec-

tricity), galvanic (or voltaic) electricity, thermo-electricity, magneto-electricity, that induced in electro-dynamic coils by secondary currents or by their movement across the lines of magnetic force, that evolved from heated substances as tourmaline, talc, &c. (pyro-electricity), and from electric fish, as the torpedo, gymnotus electricus, &c., animal electricity, and other sources of less note.

Under the word "magnetism," that of permanent, induced, or electro-magnets, under whatever form they may be set forth, is included.

It is hoped that the publication of these abridgments will prevent the disappointment consequent on repatenting an old invention, and, by setting forth what has been already done in this department of practical science, enable inventors to exert their talents upon discoveries and applications at once new and practical.

B. Woodcroft.

INTRODUCTION.

In order to render the Abridgments of Specifications in which Electricity and Magnetism are referred to as complete as possible, the following brief summary of the progress of knowledge in reference to those imponderable forces and their applications, up to the time of the commencement of the Patents, is prefixed. The summary also embraces any discoveries, inventions, or applications that are not treated of in the body of the work, at whatever date they may have been invented or brought into use.

This summary is divided into two heads:—1. Magnetism; 2. Electricity.

Magnetism.

This branch of the subject demands priority, being the most ancient form under which the action of the above-named imponderable forces was known. Under this head is included that species of force which is most developed in ferruginous matter, by which one particle attracts or repels another particle at appreciable distances; also applications of the phenomena consequent on these attractions or repulsions to useful purposes; also the nearly-allied force of diamagnetism.

The earth itself and the natural magnet or loadstone (called by some "lodestone") are the earliest examples of the magnetic power, although for countless ages such a power was unknown to man; and when the force was known, its simple and general properties were only observed in what may be termed the natural objects in which its manifestation was most apparent. The force itself was, during those comparatively dark ages, treated rather as a property of the loadstone itself (in relation to the earth and to iron), than as a distinct force, which could be transferred, and which more or less affects every substance on our globe, and most likely in the material universe. In tracing the slightest sketch of its history, therefore, it will be found that in early times the magnetic power was

believed to belong only to the loadstone; it was next believed to belong only to the loadstone and iron or steel; now, however, every material substance is found to be affected more or less by its influence. The imponderable forces of light, heat, and chemical action have also their action upon the magnetic force and are acted upon by it. Even life itself (the vital force, *vis vivæ,*) is believed by some to possess intimate relations to the magnetic power.

The CHINESE discovered the attractive power of the loadstone. In reference to the loadstone's directive power, there is mention made of the employment of a needle "to determine " the four parts of the world" on a "carr," in Duhalde's
B.C. *General History of China,* when the Emperor Hoangti gave
2600. battle to Tchi Yeou (about 2600 B.C., according to Davis' *Chinese,* p. 83); "by this method he overtook Tchi Yeou, " made him prisoner, and put him to death." In another part of the same book it is mentioned that Tchieou Kong gave certain ambassadors an instrument to direct them on their way home; one side of this instrument pointed towards the north, the other towards the south; this
1040. happened about 1040 B.C. Great doubts are, however, entertained of the veracity of the Chinese early history, therefore of these epochs also. (See *Encyclopædia Metropolitana,* Vol. III., art. Magnetism, p. 736; also *Abridgments of the Specifications relating to Marine Propulsion,* Part I., p. 4; also Sir W. Snow Harris' *Rudimentary Magnetism,* Parts I. and II., pp. 1, 3, and 5: also Davis' *Chinese,* pp. 277, 278.)

MAGNES, a shepherd, is said to have been detained on Mount Ida, in Phrygia, by the nails in his boots or by his crook; the word "Magnet" is thus supposed to be derived from the name "Magnes." Some authors derive the word "Magnet" from the province of "Magnesia," in Lydia, whence the Greeks are said to have obtained the load-
1000. stone about 1000 years before Christ. (See *Encyclopædia Metropolitana,* Vol. III., art. Magnetism, p. 735; also Sir W. Snow Harris' *Rudimentary Magnetism,* Parts I. and II., p. 1.)

1000.
600. HOMER (1000 B.C.); THALES, PYTHAGORAS (600 B.C.);

B.C.
500. EURIPIDES, PLATO (500 B.C.); ARISTOTLE (400 B.C.);
400. the Roman poet LUCRETIUS (in his philosophical poem
100. "De Rerum Natura,") and CICERO (100 B.C.), mention
the attractive powers of the loadstone. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 735; also Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 1, 2, and 3.)

A.D. PLINY, in the 36th book of his Natural History (written
100. in the 1st century after the Christian era), has an obscure
allusion to the repulsive power of the loadstone. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 8.)

400. MARCELLUS, who flourished about A.D. 400, "alludes "to the magnet as the attractor and repulsor of iron." (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 8.)

The CHINESE had craft "sailing on the Indian Ocean "under the supposed guidance of south magnetic indica-
500. "tion," "at least 700 years before it was employed by "European nations," according to Humboldt's researches. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 135.)

500. AËTIUS, about the year 500, mentions that "those who "are troubled with the gout in their hands or their feet, "or with convulsions, find relief when they hold a magnet "in their hand." (See *Aëtii Op.* l. ii. c. 25; also Beckmann's *History of Inventions*, Bohn's edition of 1846, Vol. I., pp. 43, 44.)

The CHINESE appear to have been long aware of the variation of the compass. In a Chinese work on medicine
1111. and natural history, about 1111, the following passage occurs:—"When a steel point is rubbed with the magnet it "acquires the property of pointing to the *south;* yet it "declines always to the east, and is not due south. If the "needle be passed through a wick (made of a rush) and "placed on water, it will also indicate the south, but with "a continual inclination towards the point *ping*, or $\frac{5}{6}$ "south;" this was the variation at Peking. (See Davis' *Chinese*, pp. 277, 278; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part. III., p. 80.)

A.D. GUIOT DE PROVENCE mentions, in a poem written by himself, that mariners used a "touched" needle, fixed on
1200. a bit of straw, prior to the year 1200, for a mariners' compass. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 736.)

The CAPTAINS NAVIGATING THE SYRIAN SEAS, in
1242. 1242, mounted a common sewing needle on a piece of reed or cork, and allowed it to float on the surface of water, the sewing needle having been rendered magnetic. This arrangement was used as a compass needle. (See Klaproth, *Lettre à M. Humboldt*, p. 57; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 135, 136.)

1260. PAULUS VENETUS, in 1260, brought the compass from China to Italy, according to Dr. Gilbert. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 2.)

1269. PETER ADSIGER, in a Latin letter (dated 1269) in the University of Leyden, sets forth an azimuth compass having a needle mounted on an axis, and mentions the declination of the magnetic needle. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 737.)

FLAVIO DE GIOVA, of Amalfi, is said by the Italian writers to have invented the mariners' compass about the
1320. year 1320. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 735.)

COLUMBUS remarked the variation of the compass in
1492. 1492. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 2.)

ROBERT NORMAN, a mathematical instrument maker in
1576. or near London, discovered the dip of the magnetic needle in 1576, and found it then in this latitude to be 71° 50′, or thereabouts. (See De la Rive's *Treatise on Electricity*, Vol. I., p. 165; also *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 738; also Mary Somerville's *Connexion of the Physical Sciences*, p. 335.)

JULIUS CÆSAR, a surgeon of Rimini, observed the con-
1590. version of iron into a magnet, by position alone, in 1590. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, pp. 2, 3.)

GILBERT, in his work "De Magnete," published in
1600. 1600, "represents a blacksmith hammering a steel bar in

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"the position of the inclined needle." (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 93, 94; also *Library of Useful Knowledge*, Magnetism, p. 25; also *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 739.)

Professor GUNTER, of Gresham College, discovered the
1622. change of declination in the same place, in 1622. (See De la Rive's *Treatise on Electricity*, Vol. I., p. 165.)

1630. GASSENDI, about 1630, observed that an iron bar was magnetic which had been in one position for a lengthened period of time, and had been struck by lightning. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 3.)

1650. BOND, about 1650, discovered the true progress of the deviation of the compass. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 3.)

1683. Dr. EDMUND HALLEY, in 1683, published his theory of terrestrial magnetism. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 739.)

1684. HOOKE, in 1684, heated iron rods in the magnetic meridian, and allowed them to cool in the same position, thus imparting magnetism to them. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 3.)

1687. NEWTON, in his *Principia* (published in 1687) notices the neutralizing effect of the interposition of an iron plate between a magnet and a body acted upon by it. (See Newton's *Principia*, 2nd Book, 23rd Prop., Sec. 5; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 11, 12.)

1700. MORGAGNI, about the beginning of he 18th century, used the magnet "to remove particles of iron which had "accidentally fallen into the eyes." (See Beckmann's *History of Inventions*, Vol. I., p. 44; also Maunder's *Biographical Treasury*.)

Mr. GRAHAM, an instrument maker in London, discovered the diurnal variation of the magnetic needle in the
1722. year 1722. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 739; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 86.)

1722. MARCEL, in 1722, "observed that a bar of iron acquired "a temporary magnetic state by position alone." (See Sir

A.D. W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 91, 92.)

1730. SAVERY, in 1730, magnetized hard steel bars by fitting one bar with armatures, and stroking the other bars with it, the bars being in the magnetic meridian. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 92, 93.)

1734. SWEDENBORG, in 1734, wrote upon magnetic phenomena. In his remarkable treatise, the "Principia," the spiral, helical, or vortical character of the motion of the force producing magnetic effects is prominently set forth and figured in drawings; various particulars respecting the declination of the magnetic needle are also stated, and many laws of the magnetic force theoretically indicated, that have since been proved by practical experiment. Experiments and illustrations abound in this work. (See *Principia Rerum Naturalium, sive Novorum Tentaminum Phænomena Mundi, elementaris philosophice explicandi*, Fol. Dresden, 1734, more particularly pp. 123–380, in Vol. I. of "Swedenborgii Opera.")

1746, 1747. Dr. GOWAN KNIGHT, F.R.S., a London physician, in the years 1746 and 1747, proposed a method of magnetizing steel bars by gradually withdrawing the opposite poles of magnets from beneath them, the poles being in contact with the steel bars. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 84, 85.)

1749. DU HAMEL, about the year 1749, made a further application of Dr. Knight's method of magnetizing. Two bars were magnetized at one time by being made the opposite sides of a rectangle, the other sides being formed by soft iron bars. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 85, 86.)

Professor WARGENTIN, secretary to the Swedish Aca-
1750. demy of Sciences, in 1750, noticed the effect produced on a magnetic needle by the northern lights. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 740.)

MICHELL advanced the idea (in his treatise on Arti-
1750. ficial Magnets, published in 1750) that in all the experiments of HAWKSBEE (1712), Dr. BROOK TAYLOR (1721), WHISTON, and MUSCHENBROEK (1724), "the force really

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"may be in the inverse duplicate ratio of the distances, "proper allowance being made for the disturbing changes "in the magnetic forces so inseparable from the nature of "the experiment." (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 20.)

1750. MICHELL, in 1750, employed a method of magnetizing, which he designated as "the double touch." Several steel bars to be magnetized are placed in one straight line on a horizontal plane, and the opposite poles of two powerful magnets, or of a compound magnet, are moved backwards and forwards vertically over the series, beginning and leaving off at the centre. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 86, 87.)

1751. Mr. JOHN CANTON, an English philosopher, in 1751, combined the magnetizing processes of Du Hamel and Michell. (See *Library of Useful Knowledge*, Magnetism, p. 47; also Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 87.)

1756. Mr. CANTON, about 1756, found (from 4000 observations) that the daily variation of the needle was greater in the summer than in the winter months. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 739.)

1757. EULER, BERNOUILLI, and DESCARTES, about 1757, in terrestrial magnetism, advanced the theory that the magnetic fluid moved from the equator to the poles. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, pp. 4, 5.)

ÆPINUS' celebrated treatise, "Tentamen theoriæ Elec-
1759. "tricitatis et Magnetismi," was published in 1759; this treatise contained a method of making magnets, and a theory of magnetism. The method of making magnets was a combination of Du Hamel's with Michell's "double touch;" magnets were used in place of the cross bars of soft iron. The theory was very like Franklin's single-fluid electric theory, but without the transference therein supposed. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 54; also *Library of Useful Knowledge*, Magnetism, pp. 33–36 and 47, 48; also Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 87, 88 and Part III., pp. 130, 131.)

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1760. MAYER read a paper (not since published) before the Royal Society of Gottingen, in 1760. In this paper, Mayer finds the force of magnetic attraction to correspond with the general law of that of gravitative attraction, viz., that it is according to the inverse duplicate ratio of the distances. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 20.)

1770. Father HEHL, about 1770, communicated his discoveries, relating to the effect of certain magnetized steel plates in the cure of diseases, to Anton Mesmer. (See Beckmann's *History of Inventions*, Vol. I., p. 46.)

1772, 1773, 1774. Mr. WALES noticed the effect of local attraction upon mariners' compasses. This gentleman was the astronomer to Captain Cook during his voyages in 1772, 1773, and 1774, and made the above-mentioned observations during that period. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 745; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 161.)

1775. GRAHAM, in 1775, suggested the determination of the magnetic intensity in different parts of the globe by means of the needle of oscillation or magnetic pendulum. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 93.)

1776. M. LAMBERT published two beautiful memoirs on the laws of magnetic action in the 22nd volume of "Histoire de "l'Académie Royale des Sciences," Berlin, 1776. In the first of these investigations, the action of a bar magnet upon a magnetic needle is set forth, the bar magnet being placed so that its axis is always pointed to the centre of motion of the needle, and at such a distance from the needle as to deflect it a given angle from the meridian; from the curve thus obtained the laws of magnetic action are assigned in reference to the needle's centre of motion. By this arrangement an equilibrium is obtained between three forces, viz., the magnetic force of the needle, the directive force, and the force of the magnet by which the needle is deflected or drawn from its meridian. The results obtained by this investigation are as follows:—First, "that "the action of magnetism on a magnetic needle, considered as a lever, is proportionate to the sine of the angle

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"of obliquity of its direction; and that hence the effective "force which operates in restoring the needle to its "meridian, when drawn aside from it, is directly as the "sine of the angle of its deflection." Second, that the magnetic force varies in the inverse duplicate ratio of the distances, attended with the singular result that the common centre of attraction is outside of the needle; this fact approximates the analogy of magnetic force to that of gravitation in a remarkable degree. In the subsequent memoir the "curves of the magnetic current" are investigated by the "action of the directive or polar force of a "magnet upon a small needle;" the general laws of magnetism, and the position, size, figure, and force of the great magnet, which M. Lambert supposes to reside in the earth, are also examined. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 20–33.)

1778. BRUGMANS, in 1778, observed and recorded the repulsion of bismuth and antimony by the magnetic poles, thus laying the foundation of the science of diamagnetism. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 76.)

Mr. BENJAMIN WILSON (in the Philosophical Trans-
1779. actions for 1779) published Dr. GOWAN KNIGHT's method of forming artificial magnetic paste, by means of comminuted iron and linseed oil. (See De la Rive's *Treatise on Electricity*, Vol. I., pp. 203, 204; also *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 752.)

1779. Dr. INGENHOUZ, in 1779, proposed a mariners' compass consisting of a magnetic needle enclosed in water or some other suitable fluid, in order to steady the needle. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 144, 145.)

1780. COULOMB, about 1780, propounded his double-fluid theory of magnetism; he also proposed a method of magnetizing by the "double touch," the bar to be magnetized being placed between two powerful magnetic poles. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 131, and Parts I. and II., p. 88.)

1786. CAVALLO, in 1786, made many experiments, proving that brass acquires magnetic power by hammering. (See *Library of Useful Knowledge*, Magnetism, p. 90.)

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1786. CASSINI, in 1786, discovered the annual periodical variation of the magnetic needle. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 87.)

1786, 1787. COULOMB, in 1786 and 1787, established the law that magnetic force was really in the inverse duplicate ratio of the distances, by his Balance of Torsion, and by the method of oscillations. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, pp. 742, 743; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 33–38; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 180–183, and 533–542.)

1792. The Rev. A. BENNET, F.R.S., in 1792, used a magnetic needle, suspended by a spider's thread, as a magnetometer. (See *Philosophical Transactions*, 1792, p. 86; also Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 105, 106.)

1802. COULOMB, in 1802, endeavoured to determine the question of a universal magnetism, and found all bodies that were tried finally settle in the direction of the straight line joining the poles, the needles of the various substances being suspended between opposite poles and in the same straight line with the magnet's axes. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 56.)

1804. Messrs. GAY LUSSAC and BIOT, in the year 1804, "undertook, at the desire of the French Government, an "aerostatic voyage, expressly for the purpose of ascertain- "ing whether the magnetic force experiences any per- "ceptible diminution at considerable elevations above the "surface of the earth." The result of their experiments was that the magnetic force experiences no appreciable diminution at a height of 13,124 feet above the surface of the earth. In this case the effect of the diminution of temperature on the needle was not taken into account. (See *Library of Useful Knowledge*, Magnetism, p. 89.)

1806, 1807. HUMBOLDT, in 1806–7, observed magnetic storms at Berlin. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 103.)

1809. Professor KRAFFT of St. Petersburgh, in 1809, propounded the following law of terrestrial magnetism:—"If "we suppose a circle circumscribed about the earth, having "the two extremities of the magnetic axis for its poles,

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"and if we consider this circle as a magnetic equator, the "tangent of the dip of the needle, in any magnetic latitude, "will be equal to double the tangent of this latitude." (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 7.)

Colonel BEAUFOY employed a very perfect form of variation compass. This arrangement is described in the
1813. "Annals of Philosophy" for August 1813; it consists of a telescope to determine the true meridian by astronomical observation, underneath the axis of which is a magnetic needle whose position is alterable so as to show the angular deviation of the needle from the true meridian. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 150–152; also *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, pp. 766, 767.)

1813. MORICHINI, in 1813, magnetized a needle by means of the violet ray of the spectrum. (See *Library of Useful Knowledge*, Electro-magnetism, p. 97; also Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 69.)

Mr. WESTCOTT explained his magnetic guard for needle pointers before the Committee of Mechanics of the
1817. Society of Arts, on March 27, 1817. This instrument consisted of "a number of bar magnets, smeared with "oil, placed in a frame behind the grindstone." (See *Transactions of the Society of Arts*, 1824, Vol. XLII., pp. 165, 166.)

1817. Professor HANSTEEN, of Christiana, in 1817, confirmed the law that magnetic force is inversely as the squares of the distances, by the action of the pole of a magnet upon a pivoted needle mounted as in the declination magnetometer. Professor HANSTEEN, in connection with M. MORLET, determined the position of the nodes of the terrestrial magnetic equator. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 38, 39; also *Encyclopædia Britannica*, art. Magnetism, p. 57.)

Professor BARLOW of Woolwich commenced a series of experiments on the influence of spherical and other masses of iron on the compass needle, soon after the appearance of Professor Hansteen's work on the Magnetism of the Earth
1817. in 1817, and found the existence of a plane of no deviation

A.D. of the needle at right angles to the direction of the dipping needle, and other laws of magnetic force. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, pp. 743 and 775; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 69–76.)

1818. Mr. GEORGE FISHER, in 1818, found that the rate of going of chronometers is influenced by the proximity of a mass of iron. (See *Library of Useful Knowledge*, Magnetism, p. 68.)

1820. Sir DAVID BREWSTER, in 1820, remarked the connection between the terrestrial magnetic poles and those of maximum cold. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 11; also *Edinburgh Philosophical Transactions*, 1820.)

1820. Professor BARLOW, in 1820, applied his correction plates to the vessels, "Leven," "Conway," and "Barracouta," to prevent local magnetic attraction. (See *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, p. 799; also *Transactions of the Society of Arts*, 1821, Vol. XXXIX., pp. 76–100.)

1821. Captain KATER, in 1821, found that shear steel is capable of receiving the greatest magnetic force, and that the pierced rhombus is the best form for a compass needle. He found that the directive force depends on the mass of the needle when magnetized to saturation. The method of hardening the needle preferred by Captain Kater is to harden it entirely throughout, and then soften it in the middle. (See *Library of Useful Knowledge*, Magnetism, pp. 57, 58; also *Encyclopædia Britannica*, art. Magnetism, p. 77; also *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, pp. 754, 755, and 770–773.)

1821. Mr. J. H. ABRAHAM, of Sheffield, in 1821, invented a magnetic guard to protect persons employed in pointing needles and other branches of dry grinding. According to one arrangement, a frame of bar magnets surrounds the operator's mouth; another arrangement consists in placing bar magnets just above the needles whilst they are being pointed; in the arrangement for dry-grinding cutlery, &c., the magnets are placed radially or longitudinally (or both ways) inside a hood near the point of grinding. The

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large gold medal of the Society of Arts was awarded to Mr. Abraham for this invention. (See *Transactions of the Society of Arts*, 1823, Vol. XL., pp. 135–150.)

1822. Lieutenant LITTLEWORT, R.N., in 1822, received the large silver medal of the Society of Arts for an improved ship's compass. This compass may be used either as a hanging compass, a steering compass, or an azimuth compass; for the latter purpose the suspending handle may be inverted and made to support the compass in a box (the said box being moveable about a centre), the card has a graduated silver circle, and moveable sights and a stop are annexed. (See *Transactions of the Society of Arts*, 1823, Vol. XL., pp. 70–72.)

1823. Professor BARLOW, in 1823, proposed to render the diurnal variation of the needle more distinctly marked, by deflecting it from the magnetic meridian by means of a permanent magnet. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 152, 153.)

1824. ARAGO, in 1824, found that various substances (metallic substances more especially) have an influence on the oscillations of the magnetic needle. (See *Library of Useful Knowledge*, Magnetism, p. 91.)

1825. MARY SOMERVILLE, in the summer of 1825, magnetized a sewing needle by exposing one half to the violet rays of the spectrum; in two hours the exposed end had the properties of a north pole. (See *Library of Useful Knowledge*, Electro-magnetism, p. 97.)

1825. Mr. CHRISTIE, about 1825, proved experimentally that heat diminishes magnetic force. (See *Library of Useful Knowledge*, Magnetism, p. 13.)

1829. M. KUPFFER, in 1829, observed the diminution of the magnetic force with the height, at the summit of Mount Elbrouz in the Caucasus. (See De la Rive's *Treatise on Electricity*, Vol. III., p. 242; also *Library of Useful Knowledge*, Magnetism, p. 89.)

1829. DE LA RIVE, in 1829, observed a diminution of inclination of the needle at the Hospice of the Great St. Bernard. (See De la Rive's *Treatise on Electricity*, Vol. III., p. 242.)

1830. HALDAT, in 1830, produced magnetism by the friction of hard bodies. He also proved that magnetic figures

A.D. might be formed by tracing them upon a steel plate with a magnetic pole; they are rendered visible by sifting filings of steel upon them. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, pp. 13, 14.)

1830. QUETLET, in 1830, made experiments relating to "the "successive degrees of magnetic force which a steel needle "receives during the multiple frictions which are em- "ployed to magnetize it." (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 14.)

1831. Dr. ROGET, in 1831, published an account of a mechanical instrument for generating magnetic curves. (See *Journal of the Royal Institution*, February 1831; also Leslie's *Geometrical Analysis*, p. 399; also *Library of Useful Knowledge*, Magnetism, pp. 19–22; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 66–69; also *Encyclopædia Metropolitana*, Vol. III., art. Magnetism, pp. 793–795.)

1831. Sir W. SNOW HARRIS, in 1831, invented a mariners' compass consisting of the following parts:—A light bar-edged magnet with a central cap, the said magnet being hardened and tempered throughout. Small sliders of silver compensate for the dip, the magnet having been poised horizontally before magnetization. The card consists of painted talc, and has a cross-bar of brass with adjustable sliders. The point of suspension proceeds from a double curved bar fixed as a diameter to a dense ring of copper, so as to take advantage of the ring's "magneto-electrical" restraining force in preventing the oscillations of the compass card. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 149.)

Sir W. SNOW HARRIS first employed the bifilar suspen-
1831. sion for needle magnetometers in 1831. (See *British Association Reports*, Vol. IV., p. 17; also Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 120.)

Sir W. SNOW HARRIS invented his hydrostatic mag-
1831. netometer about the year 1831. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 35 and 115.)

Sir. W. SNOW HARRIS used a modification of the scale-
1831. beam magnetometer about the year 1831. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., p. 35.)

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1831. Professor BARLOW, in 1831, coiled a hollow wooden globe with copper wire placed in the parallels of latitude. On an electric current being transmitted through this coil, "a magnetic needle suspended above the globe, and neutralized from the influence of the earth's magnetism, "exhibited all the phenomena of the dipping and variation "needles, according to its positions with regard to the "wooden globe." It is inferred from this experiment that the earth may "be considered as only transiently magnetic "by induction, and not a real magnet." (See *Encyclopædia Britannica*, art. Magnetism, pp. 64, 65; also Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 120-122; also Mary Somerville's *Connexion of the Physical Sciences*, p. 366.)

POUILLET described the astatic magnetic needle in his
1832. "Elements de Physique," Paris, 1832. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 90.)

1832. Captain MILNE, R.N., in 1832, proposed a corrected compass card to obviate the errors incidental to local attraction. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 171.)

1832. The Rev. Dr. SCORESBY, in 1832, measured distances by the action of a magnet on the compass needle. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., p. 185; also *Edinburgh New Philosophical Journal*, April 1832.)

1835. Mr. FOX, in 1835, measured the variation, dip, and magnetic intensity of the magnetic needle by means of his "dipping needle deflector." (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, pp. 87–89.)

1836. GAUSS, in 1836 and 1837, employed the unifilar and bifilar magnetometers in connection with a divided scale and theodolite, to observe the variations of terrestrial magnetism. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 212–217, also p. 308.)

1838. Professor AIRY, in 1838, proposed to correct ships' compasses, and to obviate the effects of local attraction upon them, by means of magnets. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 174-177; also *Transactions of the Royal Society*, 1839.)

A.D. The "ADMIRALTY compass," resulting from an inquiry
1838, instituted 1838–40, consists of four of Scoresby's compound
1839, magnetic bars, card of mica, copper compass bowl, and
1840. spare cards and electro-gilt steel pivots. (See Sir W. Snow Harris' *Rudimentary Magnetism*, Part III., pp. 145, 146.)

1839, Dr. KREIL, in 1839–40, at Prague, made some note-
1840. worthy observations on the influence of the moon on the magnetic elements of the earth. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 19.)

1842. Dr. LLOYD, in 1842, proposed an indirect method of measuring the inclination of the compass and its changes. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 87.)

M. PLANTAMOUR, having observed the variations of the
1842. magnetic elements at Geneva during the years 1842, 1843, points out that the position of the moon with respect to the earth is not without influence upon the movements of the magnetized needle. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 261, 262.)

1844. Baron REICHENBACH, in 1844, made researches respecting the action of the magnet upon the human frame, more especially upon certain people denominated "sensitives." These people, in an absolutely dark room, uniformly perceived luminous emanations of various tints at different parts of the magnet. The luminosity of the magnetic emanation was confirmed by the fact of its image being able to be fixed on a daguerreotype plate. Other effects of magnets on the human frame are described. (See Reichenbach's *Researches on Magnetism, Electricity, Heat, Light, Crystallization, and Chemical Attraction in their relation to Vital Force.* Translated and edited by Dr. Gregory, London, 1846.)

1845. FARADAY, in 1845, discovered that when a ray of polarised light is made to pass through a piece of heavy glass (consisting of silico-borate of lead) placed near a magnetic pole, in such a manner that the lines of magnetic force shall pass through the glass in the direction of the ray, the ray rotates according to the following law:—"If a mag- " netic line of force be *going from* a north pole or *coming*

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"*from* a south pole along the path of a polarized ray "coming to the observer, it will rotate that ray to the "right hand, or if such a line of force be coming from a "north pole or going from a south pole, it will rotate such "a ray to the *left hand*." (See *Philosophical Transactions*, 1846, Vol. I., p. 1; also Gmelin's *Handbook of Chemistry*, Vol. I., pp. 168, 169; also Sir W. Snow Harris' *Rudimentary Magnetism*, Parts I. and II., pp. 71-73.)

1846. M. WARTMANN, about the year 1846, "announced that "a piece of rock salt, placed in the route of polarized "rays of heat, determines the rotation of the plane of "polarization, if a powerful electro-magnet is made to act "upon it." (See De la Rive's *Treatise on Electricity*, Vol. I., p. 525.)

1846. FARADAY, in 1846, propounded the laws of diamagnetism. According to this discovery, certain bodies are found to place themselves at right angles to the straight line joining the poles of a magnet, when freely suspended so as to be capable of motion in all directions round a centre; this position is called "equatorial," in contradistinction to that assumed by magnetic bodies, such as iron, which are said to take up an "axial" direction when under magnetic influence. In these investigations the most powerful magnetic bodies were found to be iron, nickel, cobalt, manganese, and chromium; the most powerful diamagnetic bodies were found to be bismuth, phosphorus, antimony, heavy glass, and zinc. (See *Athenæum*, January 31, 1846; also *Practical Mechanic and Engineers' Magazine*, February 1846, pp. 117, 118.)

1847. Professor BANCALARI, in 1847, published his researches on the diamagnetism of flames and gases. (See Noad's *Manual of Electricity*, pp. 842-844.)

1847. BROOKE, in 1847, invented the photographic system of registering the variations of terrestrial magnetism, and subsequently put it into practice at Greenwich. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 217-222, also p. 308.)

1848. FARADAY, in 1848, discovered magneto-crystalline force. The line in which this directive force is exerted is called the "magne-crystalline line;" this line is found to have

A.D. relation to the crystallization and optic axes of bodies in which its presence is manifested. MM. PLUCKER and BEER also made experiments showing the nature of this force. (See *Athenæum*, No. 1103, p. 1266; also Gmelin's *Handbook of Chemistry*, Vol. I., pp. 514–519; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 482–497.)

1850. MM. TYNDALL and KNOBLAUCH, in 1850, succeeded in showing the relation of the magneto-crystalline force, or manifestation of force, to magnetic and diamagnetic force. They found "that the magnetic properties of the optical "axis are connected with a general principle, namely, that "when the molecular constitution of any body is such that "the particles of which it is formed are nearer to each "other, according to a certain direction, than in the rest "of the mass, this direction, all other circumstances re-"maining the same, is that in which the forces which "are acting upon the body manifest their action with "the greatest energy; so that the line which represents "this direction places itself axially or equatorially, accord-"ing as the substance is magnetic or diamagnetic." (See *Philosophical Transactions*, 1850, Vol. XXXVII., p. 1; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 490–497.)

1851. General SABINE, in 1851, drew the following conclusions from the magnetic observations made by the English and Russian governments. That the terrestrial magnetic force has periods respectively of—1. A solar day of 24 hours; 2. A solar year of 365 days; 3. Ten solar years. From this it would appear that the sun is a great magnet, and that it communicates to the earth its magnetic properties. (See *Encyclopædia Britannica*, 8th edition, art. Magnetism, p. 18.)

1852. Mr. JOHN ADIE, in 1852, constructed a variation compass in which the needle was suspended within a tube. Mr. SWAN employed a different arrangement of the same principle. (See *Encyclopædia Britannica*, art. Magnetism, p. 80.)

1856. Professor TYNDALL, in 1856, proved the existence of diamagnetic polarity. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 729–740.)

Electricity.

Under this head is included static or tension electricity, current electricity, and induced electricity in their various forms; also the results of combining electric force with magnetic force (electro-magnetism), with chemical action (electro-chemistry), with heat and light (electric blasting, electric light, &c.), with mechanical force (electric telegraphy, electro-motion, &c.), and with vital force (medical electricity, &c.)

The production or development of electric force in nature, and its existence and use prior to the researches of man, will be evident to most minds; the following examples bear upon this point:—*Static or tension electricity* in the form of lightning; *current electricity*, as developed by galvanic circuits acting in the natural formation of minerals, also as developed by thermo-electric circuits formed by the unequal temperature of the earth; and *induced electricity* (developed by other electric currents and by terrestrial magnetic force in conjunction with mechanical motion), believed by many astronomers to be included in the category of forces which bind planets to their primary, and system to system. As in magnetism, electricity was first believed to belong to one body exclusively, viz., amber; other "electrics" (as glass, resin, sulphur, &c., all non-conductors) were next recognized; it is now, in its various forms, known to pervade the whole of nature, and to administer silently but effectually to the wants of man.

Holy Writ makes mention of lightning in the following passages:—*Exodus*, xix., 16; 2 *Samuel*, xxii., 15; *Job*, xxxvii., 3; xxxviii., 25; xxxviii., 35; *Psalms*, xviii., 14; lxxvii., 18; xcvii., 4; cxxxv., 7; cxliv., 6; *Jeremiah*, x., 13; li., 16; *Ezekiel*, i., 13; i., 14; *Daniel*, x., 6; *Matthew*, xxiv., 27; *Luke*, xvii., 24; *Revelations* iv., 5; xi., 19. Thunder is mentioned in the following passages:—*Exodus*, ix., 23; ix., 28; ix., 29; ix., 33; xix., 16; xx., 18; 1 *Samuel*, vii., 10; xii., 17; xii., 18; 2 *Samuel*, xxii., 14; *Job*, xxvi., 14; xxxvii., 5; xl., 9; *Psalms*, xviii., 13; lxxvii., 18; lxxxi., 7; civ., 7; *Isaiah*, xxix., 6; *Mark*, iii., 17; *John*, xii., 29; *Revelations*, vi., 1; x., 3; xix., 6. The wonderful passage from *Job*, xxxviii., 35, "Canst thou send "lightnings, that they may go, and say unto thee, Here "we are!" (original Hebrew "Behold us!") seems almost

B.C. prophetic, when viewed in connection with the electric telegraph.

600. The ETRUSCANS (about 600 B.C.) devoted themselves to the study of atmospheric phenomena in an especial manner, and divided the lightnings into those that came from the earth and those that came from the sky; they are said to have drawn down lightning. (See De la Rive's *Treatise on Electricity*, Vol. III., p. 90; also *Encyclopædia Britannica*, 8th edition, art. Etruscans or Tuscans, pp. 355–361.)

600. THALES, about 600 B.C., is reported by subsequent writers to have described the power of attracting light bodies which is developed in amber by friction. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 41.)

341. ARISTOTLE, about 341 B.C., records that the torpedo "causes or produces a torpor upon those fishes it is about "to seize, and having by that means got them into its "mouth feeds upon them." He further adds that this fish "hides itself in the sand and mud, and catches those "fish that swim over it by benumbing them, and of this "some have been eye-witnesses: the same fish has also the "power of benumbing men." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 41; also *Encyclopædia Britannica*, 8th edition, art. Electricity, p. 530.)

321. THEOPHRASTUS, about 321 B.C., mentions that the "lyncurium" (tourmaline?) has similar properties to amber in regard to the attraction of light bodies. Beckmann thinks the "lyncurium" was not tourmaline, but more likely to have been the hyacinth. (See *Encyclopædia Britannica*, 8th edition, art. Electricity, p. 529; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 41; also

A.D. Beckmann's *History of Inventions*, Vol. I., pp. 86–98.)

50. SCRIBONIUS LARGUS (A.D. 50) relates that Anthero, a freedman of Tiberius, was cured of the gout by the shocks of the torpedo. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 41.)

1160. EUSTATHIUS, Bishop of Thessalonica (A.D. 1160), in the scholia upon Homer, relates that "Walimer the father "of Theodoric, who conquered as they say the whole of "Italy, used to emit sparks from his own body; and a cer-

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"tain ancient philosopher says of himself, that once, when "he was dressing and undressing himself, sudden sparks "were emitted occasionally, crackling; and sometimes he "says, entire flames blazed from him, not burning his "garment." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 41, 42.)

Dr. GILBERT, in his work "De Magnete," published
1600. A.D. 1600, adds several substances besides amber to the list of electrics, and states that not only light bodies, but all solid bodies whatever, including metals, water, and oil, are attracted by excited electrics. "These experiments he "directs to be performed by bringing the excited body near "to the end of a light needle of any metal balanced, and "turning freely on a pivot like the magnetic apparatus." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 42.)

1617. STRADA, in 1617, published his "Prolusiones Academicæ." In one of these he speaks of a supposititious means of communication between two friends at a distance from each other. "Strada's fancy was this. There is, he supposes, a "species of loadstone which possesses such virtue that if "two needles be touched with it, and then balanced on "separate pivots, and the one be turned in a particular "direction, the other will sympathetically move parallel to "it. He then directs each of these needles to be poised "and mounted on a dial having the letters of the alphabet "arranged round it. Accordingly, if one person has one "of the dials and another the other, by a little pre-arrange-"ment as to details, a correspondence can be maintained "between them at any distance by simply pointing the "needles to the letters of the required words." A free translation of the poem, in English heroics, was published in 1750, in "The Student, or the Oxford and Cambridge "Miscellany," signed Misographos. (See *Saturday Review*, August 21, 1858, p. 190: also Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 58, 59.)

BOYLE, in his "Experiments and Notes about the Me-
1675. "chanical Origin of Electricity," published in 1675, states that warming the electric increases the electrical effect. He also added to the list of electrics, and "ascertained that the "converse of all the experiments upon the relative motion

A.D. "of the attracted and attracting body was also true; "namely, that if the substance to be attracted were fixed, "and the excited electric capable of motion, their union "would still take place." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 42, 43.)

1675. OTTO GUERICKE was contemporary with Boyle. He added the following discoveries to electric science:—An electrical machine with a globe of sulphur as the substance to be excited; the discovery of the light and sound accompanying strong electrical excitation; electrical repulsion; and that light bodies suspended within the sphere of action of an excited electric themselves become possessed of electrical excitation. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 43.)

1675. NEWTON, in the year 1675, communicated to the Royal Society the fact that when a plate of glass is excited on one side, the other side also becomes electrical. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 43.)

1676. Mr. HAWARD, in 1676, relates of GROFTON, master of the ship in which the circumstance occurred, that a violent thunderstorm reversed the polarity of the compass needles. (See *Philosophical Transactions*, July 18, 1676, pp. 647, 648; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 118.)

1700. DU VERNEY, in 1700, knew that the limbs of a frog convulsed by the action of electricity. (See *Histoire de l'Académie Royale des Sciences*, 1700, p. 40; also *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 220.)

HAWKSBEE used a glass electrical machine (1709), and made many experiments in respect to electric light. His
1705. discoveries extend from 1705 to 1711. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 43–45.)

1707. J. G. S., in 1707, published a German book, entitled "Curious Speculations during Sleepless Nights." In this work occurs a notice of the electricity of the tourmaline as developed by heat. He affirms that the Dutch brought the tourmaline from Ceylon in 1703. (See Beckmann's *History of Inventions*, Vol. I., p. 89.)

1708. Dr. WALL, in the "Philosophical Transactions" for 1708, remarks, respecting the light and sound attendant upon the

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electrical excitation of a large stick of amber, as follows :—
" This light and crackling seems in some degree to repre-
" sent thunder and lightning." (See Bakewell's *Electric Science*, p. 12; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 44.)

1720. GRAY and WHELER'S experiments extend from 1720 to 1736. The discoveries relating to tension electricity which these experiments embrace are as follows:—The ability to electrically excite metals when they are insulated (1729–31); that the human body is a conductor of electricity (1731); that when sulphur is fused and suffered to cool, it acquires a strong electrical property, particularly when it is cast in glass—certain resins have also a similar property; that the glass in which the sulphur is cast is also electrical; and that bodies may be preserved for months in an electrically excited state by wrapping them in worsted (1732).
" Mr. Stephen Gray, just before he died, hit upon an
" experiment which seemed to indicate, that the attractive
" power which regulates the motions of the heavenly
" bodies, is of the *electric* kind. The experiment was this:
" He fixed a large, round, iron-ball upon the middle of a
" large cake of rosin and wax; and exciting the virtue
" strongly in the cake, a fine feather, suspended by a thread,
" and held near the iron-ball, was carried round it, by the
" effluvia, in a circular manner, and performed several revo-
" lutions: it moved the same way with the planets, from
" west to east, and its motion, like theirs, was not quite
" circular, but a little elliptical." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 45–47; also *A new Universal History of Arts and Sciences*, Vol. I., art. Electricity, pp. 460, 461.)

1729. GRAY and WHELER, in February 1729, produced motion in light bodies at a distance of 666 feet by means of frictional electricity. This experiment was tried with a view to ascertain the distance through which the electric force could be transmitted; it thus possesses an interest in connection with electric telegraphs. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 45, 46; also *Saturday Review*, August 21, 1858, p. 190.)

1733. DU FAY'S experiments extend from 1733 to 1737. His discoveries are as follows:—That all insulated bodies may

A.D. be electrically excited more or less; "that all electric "bodies attract all that are not so, and repel them as soon "as they become electric by the vicinity or contact of the "electric body;" and that there are two distinct developments of electricity, one from excited glass, and the other from excited resin; bodies being electrified by the same substance repel one another, by opposite substances attract one another. Du Fay thus originated his dual theory of electricity. In some experiments Du Fay was assisted by the Abbé NOLLET. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 46, 47.)

1734. SWEDENBORG, in 1734, in his "Principia," puts forward the following theoretical views in advance of the age in which he lived and of interest to electricians:—1. Electrical effects are referred to a force less subtile than that producing magnetic effects. 2. Electrical effects are said to be produced by the gyration (movement in a spiral, helical, or circular path) excited by the tremulation of the particles of bodies. 3. Lightning is referred to the same origin as electricity. 4. Other polar forces besides magnetism are recognized, and amongst them electricity. 5. All forces moving in a spiral or helical path, and therefore magnetic and electric forces, vary in the inverse duplicate ratio of the distances. (See *Principia Rerum Naturalium, sive Novorum Tentaminum Phænomena Mundi, elementaris philosophice explicandi*. Fol. Dresden, 1734, in Vol. I. of "Swedenborgii Opera," pp. 410, 409, 427, 48, 49, 81, 60, 61.)

1741. BOZE, in 1741, introduced the prime conductor, suspended from silk threads to the electrical machine, and "proved by many experiments, that the weight of bodies "was not affected by giving to them, or abstracting from "them, electricity." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 48.)

1741. WINKLER, in 1741, in the electrical machine "substituted "a cushion for a rubber instead of the hand." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 48.)

1742. Dr. DESAGULIERS, in 1742, published an essay on electricity, in which he "distinctly divided bodies into "*electrics* and *non-electrics* or conductors;" he also accounted "for the superior success of electrical experi-

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"ments in frosty weather, and in dry states of the "atmosphere" by attributing it to the conducting properties of the vapour of water. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 47, 48.)

1742. Mr. GORDON, about 1742, used a glass cylinder for an electrical machine instead of a globe. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 48.)

1744. LUDOLF of Berlin, about 1744, ignited combustible substances by the electric spark. He set fire "to the "ethereal spirit of Frobenius." (See *Encyclopædia Britannica*, 8th edition, art. Electricity, p. 526; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 48.)

1745. Dr. MILES, in 1745, "observed the pencil of luminous "rays proceeding from an excited electric, even without "the approach of a conducting body." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 48.)

1745. Dr. WATSON, in 1745, made some experiments and researches respecting the electric spark, and "showed that "in electrifying conductors of considerable extent, elec- "tricity is first developed at that part which is most "remote from the excited electric." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 48.)

1745. MUSCHENBROEK and KLEIST, in 1745, simultaneously discovered the Leyden jar. According to Dalibard,
1746. however, the inventor's name was CUNEUS (1746). Exaggerated accounts were given of the effects of the shock from the Leyden jar by these philosophers; public attention was thereby drawn to the subject of electricity more by this than by any previous discovery. The Leyden jar was perfected by Sir W. WATSON, SMEATON, BEVIS, WILSON, and CANTON. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 48; also Bakewell's *Electric Science*, pp. 14–17; also Sir W. Snow Harris' *Rudimentary Electricity*, pp. 58–74.)

1746. Dr. WATSON, in 1746, proposed a single-fluid theory of electricity very like that of Dr. Franklin's. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 49.)

1746. LE MONNIER, in 1746, showed that electricity was communicated to homogeneous bodies in proportion to

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1746. The Abbé NOLLET, in 1746, found that electricity accelerates the efflux of fluids through capillary tubes. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 49.)

1746. Mr. MAIMBRAY at Edinburgh, in October 1746, electrified two myrtle trees for a month, and found them put forth leaves and blossoms sooner than those that had not been electrified. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 49.)

1747. PIVATI, in 1747, stated that the effect of medicines was conveyed through electrified glass tubes; it was afterwards found, however, that the electric force in this case performed the alleged cures. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 50.)

FRANKLIN'S first communication to Mr. Peter Col-
1747. linson, of the Royal Society, is dated March 28th, 1747. In these series of communications he propounds his single-fluid electrical theory. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 50.)

1747. Dr. WATSON, in 1747, in the presence of many scientific persons, transmitted electricity through 2800 feet of wire and 8000 feet of water, thus making use of the *earth circuit*. This fact is interesting in a telegraphic point of view. (See Highton's *Electric Telegraph*, p. 11.)

1748. BENJAMIN FRANKLIN, in 1748, performed his celebrated experiments on the banks of the Schuylkill in North America. These experiments "were concluded by "a pic-nic, when spirits were fired by an electric spark "sent through the river, and a turkey was killed by the "electric shock and roasted by the electric jack before a "fire kindled by the electrified bottle." (See *Penny Cyclopædia*, Supplement 2; also *Saturday Review*, August 21, 1858, p. 190.)

1748. JALLABERT, at Geneva, since 1748, "entertained the "idea of submitting some invalids to electrical treatment, "by drawing sparks from different parts of their body, "which he brought near to the conductor of an electrical

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"machine." Paralysis in the right arm was ameliorated by this means. (See De la Rive's *Treatise on Electricity*, Vol. III., p. 586.)

1751. CANTON's discoveries range from 1751 to 1762. They are as follows:—That the excitement of positive or of negative electricity depends upon the rubber used, as well as upon the electric rubbed, and upon the condition of its surface; that a body of air in a state of rest can be electrified; and that an amalgam of tin can be applied advantageously to the cushion of an electrical machine. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 52.)

1752. M. DALIBARD, in 1752, erected a lightning rod, and sparks from it were first observed by his assistant on May 10th. (See Bakewell's *Electric Science*, p. 21; also De la Rive's *Treatise on Electricity*, Vol. III., p. 92.)

1752. M. DE ROMAS, in 1752, elevated an electrical kite and obtained proofs of the existence of atmospheric electricity. (See *Encyclpædia Metropolitana*, Vol. IV., art. Electricity, p. 134; also De la Rive's *Treatise on Electricity*, Vol. III., p. 92.)

1752. FRANKLIN, in June 1752, proved the identity of lightning and electricity at Philadelphia by his celebrated kite experiment. He immediately applied this discovery to useful purposes by inventing metallic conductors to protect buildings from the effects of lightning. (See Bakewell's *Electric Science*, p. 22; also De la Rive's *Treatise on Electricity*, Vol. III., pp. 91, 92; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 134, 135.)

1753. Professor RICHMANN of St. Petersburgh, in August 1753, fell a victim to his experiments upon lightning, being killed by a thunder clap whilst examining its effects upon an electrometer of his own construction. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 52; also Bakewell's *Electric Science*, pp. 23, 24.)

C. M. of Renfrew (CHARLES MARSHALL of Paisley?)
1753. wrote a letter, dated February 1st, 1753, "to the author of "the Scots' Magazine," proposing a plan for an electric telegraph. The insulated wires were supposed to be stretched in the air, and were to be equal in number to the

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1753. BECCARIA, in 1753, published the results of his experiments; they related to the speed of transmission of electricity through various media, and showed particularly the imperfect conducting power of water. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 52.)

1759. Mr. DELAVAL, between the years 1759 and 1764, communicated to the Royal Society certain experiments to ascertain "the conducting powers of the same body in "different states." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 53.)

1759. ÆPINUS, in 1759, announced the production of electricity by heating the tourmaline, and that opposite electricities were developed in opposite points of the stone. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 53.)

1759. Mr. ROBERT SYMMER, in 1759, in a communication to the Royal Society, advanced the theory that there are two electric fluids, but that they are not independent of one another, as Du Fay supposed, on the contrary, they are co-existent, and simultaneously developed by electrical excitation. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 53, 54.)

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1759. ÆPINUS and WILCKE, in 1759, electrified "two surfaces of a plate of air, so as to obtain a shock from the discharge of these surfaces, exactly on the principle of the Leyden jar." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 54.)

ÆPINUS, in his "Tentamen Theoriæ Electricitatis et
1759. Magnetismi," published at St. Petersburgh in 1759, brought mathematical science to bear upon Franklin's single-fluid theory. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 54.)

1760. CANTON, in 1760, discovered the electric excitability of the topaz upon the application of heat. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 132.)

M. SULZER, in his "Theory of Agreeable and Disagree-
1762. able Sensations," published at Berlin in 1762, noticed the peculiar sensation occasioned by a piece of silver and a piece of lead in contact with each other and with the tongue, and thought this effect might result from solution of either of the metals. This sensation is now known to be an effect of electrolytic action. (See Bakewell's *Electric Science*, p. 29.)

LANE's discharging electrometer was contrived about the
1767. year 1767. (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 86.)

JOSEPH BOZOLUS (a Jesuit, and lecturer on natural philosophy at Rome) invented "a practicable system of telegraphing, similar to that of C. M." (See a Latin poem entitled *Mariani Parthenii Electricorum*, in VI.
1767. Libros, Roma, 1767, p. 34; also *Saturday Review*, August 21, 1858, p. 190.)

1771. Mr. HENRY EALES, in 1771, "originated a doctrine of opposite electric forces." (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 33.)

1772. Mr. W. HENLEY, F.R.S., in 1772, invented the quadrant electrometer. He also invented a "universal discharger." (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 78.)

1774. LESARGE, in 1774, "employed 24 wires and a pith-ball electrometer," to communicate signals by frictional electricity. (See Highton's *Electric Telegraph*, pp. 38 and 40.)

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1776. Mr. CAVENDISH, in 1776, described an artificial torpedo, with which he exhibited the ordinary properties of this fish. (See *Philosophical Transactions*, 1776; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 54.)

1776. VOLTA, in 1776, made known the properties of the electrophorus. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 55.)

1776. VAN MARUM, about 1776, employed an electrical machine, consisting of a circular disc of shellac. (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 46.)

1777. LICHTENBERG, about 1777, published his discovery of the phenomena of "electrical figures." These figures are produced by sifting pulverized sulphur and minium on to electrized resin. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 101.)

1777. BECCARIA, about the year 1777, "found that a needle " through which he had sent an electric shock, had, in " consequence, acquired a curious species of polarity; for " instead of turning as usual to the north and south, it " assumed a position at right angles to this, its two ends " pointing to the east and west." (See *Library of Useful Knowledge*, Electro-magnetism, p. 3.)

1781. Mr. WARLTIRE, in 1781, related his experiment of producing water by the union of "inflammable and common " air" to Dr. Priestley. The mixture of the two gases was placed in a close vessel, and fired by electricity. (See Noad's *Lectures on Chemistry*, pp. 182, 183.)

1781. MAUDUYT, in 1781, published certain observations, from which he concluded that the application of electricity was favourable in paralysis. He placed the patient on an insulating stool, and put him into communication with the conductor of an electric machine. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 586, 587.)

1785. COULOMB, about 1785, applied his "torsion balance" and "proof plane" to the measurement of electrical force, and the investigation of its distribution. (See Sir W. Snow Harris' *Rudimentary Electricity*, pp. 81–83; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 70, 71.)

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785. Van Marum and Cuthbertson, in 1785, constructed the large Tylerian electric machine at Haarlem. Cuthbertson also invented a discharging electrometer, which measures the electric intensity by the weight able to be overcome. (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 47; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 98, 99.)

785. M. Haüy, in 1785, knew the electric properties of calamine and of sphene, as developed by heat. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 133, 134.)

786. Mr. Bennet, in 1786, by his electroscope, discovered the electricity developed by sifting powders. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 122.)

787. Mr. Bennet, in 1787, first noticed that electricity was developed during the separation of the particles of bodies. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 138.)

787. M. Haüy, in 1787, made the following discoveries:— That electricity is developed by heat in the minerals *mesotype* and *prehnite;* and that Iceland spar and some other crystals become electric by pressure. He also established many of the laws of pyro-electricity. (See Haüy's *Minéralogie*, Vol. II., p. 604; also *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 132, 133, and 138, 139.)

787. M. Brard, about 1787, remarked that some crystals of axinite become electric by heat. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 132.)

787. Lomond, in 1787, in an electric telegraph, employed one wire and a pith-ball electrometer. (See Highton's *Electric Telegraph*, pp. 28 and 41.)

787. Betancourt, in 1787, used a telegraphic arrangement of one line wire and a battery of Leyden jars. (See Highton's *Electric Telegraph*, pp. 38 and 41, 42.)

788. Cavallo, about 1788, made known his condenser and other similar improvements. Other "condensers," "multi-" pliers," and "doublers," were invented about this period. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, p. 91.)

A.D. The Abbé BARTHELÉMY "is said to have suggested "an electric telegraph in his well-known work 'Voyage
1788. "'du Jeune Anacharsis,' which appeared in 1788." The fanciful idea is as follows:—Two clocks were to have similarly magnetized hands; artificial magnets were presumed to be so far improved that they could convey their directive power to a distance, thus, by the sympathetic movements of the hands or needles in connection with a dial alphabet, communications between distant friends could be carried on. (See Mr. Macgregor's letter in the *Society of Arts Journal*, May 20, 1859, pp. 472, 473.)

MM. FOURCROY, VAUQUELIN, and SEGUIN'S grand experiment of the composition of water from its consti-
1790. tuent gases was commenced on May 13, 1790, and continued without intermission until its finish on the 22nd of the same month. The gases were fired in a close vessel by means of electricity, and produced a nearly equal weight of water. (See Ure's *Dictionary of Chemistry*; also Noad's *Lectures on Chemistry*, pp. 183, 184.)

1790. PAETZ and VAN TROOSTWIK, in 1790, decomposed water into its constituent gases by passing the electric spark through it, very fine gold wires being used as electrodes. (See De la Rive's *Treatise on Electricity*, Vol. II., p. 443.)

1791. HAÜY, in 1791, discovered the electrical properties developed in borate of magnesia (boracite) by heat. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 131, 132.)

1791. GALVANI, in 1791, found that the limbs of a frog were convulsed when his pupil touched them with a dissecting knife at the same time that a spark was drawn from the prime conductor of an electrical machine. He afterwards found that similar convulsions were produced by establishing a communication between the nerves and muscles by means of metals; thus laying the foundation from which the galvanic battery afterwards sprung, also of the science of animal electricity. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 220; also Bakewell's *Electric Science*, pp. 27–29; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 29, 30, Vol. II., pp. 483 and 488, 489, and Vol. III., pp. 3–6.)

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1791. KEIR, in 1791, knew that iron and other metals could be made "passive" or electro-negative, so as not to be soluble in acids. (See Gmelin's *Handbook of Chemistry*, Vol. I., p. 353.)

1793. Dr. FOWLER, in 1793, made a great number of experiments on the effects of galvanism in different animals, and on different parts of animals. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 220.)

1793. VOLTA, in 1793, in a letter to Cavallo, laid the foundation of the contact theory of galvanism. (See *Philosophical Transactions*, 1793; also *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 220.)

1794. REIZEN, in 1794, had an electric telegraph of 26 line wires; the letters of the alphabet were cut out in pieces of tinfoil, and rendered visible by sparks of electricity. (See Highton's *Electric Telegraph*, pp. 38 and 42, 43.)

1795. CAVALLO, in 1795, used an electric telegraph with one wire; the number of sparks was made to designate the various signals, and the explosion of gas was used for an alarum. (See Cavallo's *Traité de l'Électricité*, 4th edition, Vol. III., p. 285; also Abbé Moigno's *Traité de Télégraphie Électrique*, p. 61; also Highton's *Electric Telegraph*, pp. 38 and 43.)

1795. Dr. WELLS, in 1795, found that charcoal may be employed to excite the galvanic influence, and that it is a conductor of that influence. He supposed galvanism and electricity to be identical. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 220, 221.)

1796. SALVA, in 1796, invented an electric telegraph, the exact particulars of which are unknown. (See Highton's *Electric Telegraph*, pp. 38 and 43, 44.)

1796. ALDINI, about 1796, produced, by galvanism, powerful muscular contractions upon the head of an ox recently killed. (See De la Rive's *Treatise on Electricity*, Vol. II., p. 489.)

NICHOLSON'S spinning condenser was made known in
1797. "Nicholson's Journal" of April 1797. Hooks connected to tinfoil mounted suitably on glass planes, one of which revolves while the other is quiescent, conduct the charges successively derived from the electrified body to electroscopic balls; a rotation given by the finger and

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1799. FABRONI, in 1799, "enters into an enquiry whether "the phenomena of galvanism may not originate from the "action of chemical affinities, of which electricity may "be one of the concomitant effects." (See *Journal de Physique,* xlix., 348; also *Encyclopædia Metropolitana,* Vol. IV., art. Galvanism, pp. 215, 216.)

1800. VOLTA, on the 20th of March, 1800, "addressed a letter "to Sir Joseph Banks, then President of the Royal Society, in which he announced to him the discovery "of 'the voltaic pile;'" this letter was read before the Royal Society on June 26, 1800: the arrangement used consisted of discs of silver, zinc, and moistened card, placed in series. "La Couronne de Tasses" was afterwards invented by Volta; this arrangement consisted of a circle of cups, each cup containing solution of salt, silver, and zinc, thus forming a perfect Voltaic or galvanic battery. (See Bakewell's *Electric Science,* pp. 29, 30; also Highton's *Electric Telegraph,* p. 13.)

Messrs. NICHOLSON and CARLISLE, on the 2nd of May,
1800. 1800, decomposed water by the voltaic pile. They constructed a voltaic pile by means of the particulars given in the first four pages of Volta's letter, Sir Joseph Banks having, at the end of April, shown this part of the communication to Sir Anthony (then Mr.) Carlisle. (See Highton's *Electric Telegraph,* pp. 27–29.)

1800. MR. CRUICKSHANK, in 1800, arranged metallic plates and a liquid according to the principle of Volta's pile, but horizontally in a trough instead of vertically, the plates themselves forming the cells. He also changed the color of litmus paper by the galvanic current. (See Highton's *Electric Telegraph,* pp. 13, 14, and 29.)

1800. DR. HENRY of Manchester, about the year 1800, by the galvanic battery, decomposed the nitric and sulphuric acids and resolved ammonia into its elementary consti-

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tuents. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 221, and art. Chemistry, p. 611.)

1801. Dr. Wollaston, in 1801, used ordinary frictional electricity to decompose water by means of his guarded poles. These poles were made by fusing the end of a capillary tube round a gold wire, and grinding the tube down gradually until the least possible portion of the wire was exposed; he was thus able to transmit the power of the electrical machine as a continuous current. (See De la Rive's *Treatise on Electricity*, pp. 444, 445.)

1801. Dr. Wollaston, in 1801, "decidedly pronounced that "the oxidation of the metal in the pile is the primary "cause of its electrical effects." (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 216.)

1801. Gerboin, in 1801, pointed out certain movements of mercury in an inverted syphon, beneath the positive pole of a galvanic battery, the said pole being immersed in an electrolytic solution, which covers the surface of the mercury, and the other pole of the battery being connected to the mercury in the other leg of the syphon. (See De la Rive's *Treatise on Electricity*, Vol. II., p, 433.)

A Contributor to the Monthly Magazine for April,
1802. 1802, says that "Galvanism is at present a subject of "occupation of all the German philosophers and chemists. "At Vienna an important discovery has been announced "—an *artificial magnet*, employed instead of Volta's pile, "decomposes water equally well as that pile or the electrical machine, whence it has been concluded that the "*electric*, *galvanic*, and *magnetic* fluids are the same." This announcement is of interest in respect to magneto-electricity. (See Bakewell's *Electric Science*, p. 40.)

1803. Trommsdorff, about the year 1803, discovered the efficacy of large plates, in galvanic batteries, in producing combustion of thin metallic leaves. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 221.)

1803. Hisinger and Berzelius, in 1803, "ascertained, by a "numerous series of experiments, the transfer of the ele-"ments of water and of neutral salts to the respective "poles of the battery." (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 221, 222; also *Gehlen's Journal*, Vol. I., 1803.)

A.D. 1803. Mr. Carpue, in 1803, published some note-worthy experiments on the therapeutic action of common electricity. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electricity, pp. 105, 106.)

1803. M. Thillaye gave, in 1803, a great number of useful precepts on the medical application of ordinary electricity. He used electric brushes, held by an insulated handle and put into communication with the conductor of the machine. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 587, 588.)

1803. Aldini, in 1803, sent a galvanic current through the body of a criminal executed at Newgate. The most violent agitations and muscular contractions were produced. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 196, 197, and 221.)

1803. Mr. Dyekhoff, about 1803, made a dry electric column. (See Sturgeon's *Lectures on Galvanism*, p. 73.)

1805. Behrens, in 1805, constructed a dry pile of 80 pairs of zinc, copper, and gilded paper. (See De la Rive's *Treatise on Electricity*, Vol. II., p. 852.)

1805. Romagnési, a physician of Trente, about the year 1805, observed that the magnetized needle "experiences a decli- " nation," when submitted to the action of the galvanic current. (See *Manuel du Galvanisme*, par Joseph Izarn, Paris, 1805, p. 120; also *Journal of the Society of Arts*, April 23, 1858, p. 356.)

1805. M. Mojon, a chemist of Gènes, about the year 1805, observed that unmagnetized needles, when submitted to the action of the galvanic current, "acquire, by this means, " a kind of magnetic polarity." (See *Manuel du Galvanisme*, par Joseph Izarn, Paris, 1805, p. 120; also *Journal of the Society of Arts*, April 23, 1858, p. 356.)

1805. Brugnatelli, in 1805, "gilt in a complete manner " two large silver medals, by bringing them into commu- " nication by means of a steel wire, with the negative pole " of a voltaic pile, and keeping them one after the other " immersed in ammoniuret of gold, newly made and well saturated." (See Smee's *Electro-metallurgy*, History, pp. xxv., xxvi.; also a letter from Brugnatelli to Van Mons in the *Philosophical Magazine*, 1805.)

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1807. Sir HUMPHREY DAVY, on October 6th, 1807, made his celebrated discovery of the compound nature of the alkalies. By means of a battery power of 274 pairs of plates, he decomposed potash, and found that potassium was formed on the application of galvanic power to a piece of moistened potash. Sir Humphrey's delight on this memorable occasion was excessive; on seeing the globules of potassium burst through the crust of the potash, and take fire as they entered the atmosphere, he could not contain his joy, and some time was required for him to compose himself sufficiently to continue the experiment. (See Noad's *Lectures on Chemistry*, pp. 32, 33; also Bakewell's *Electric Science*, pp. 33–35.)

1808. NAPOLEON, in 1808, presented a trough galvanic battery of 600 pairs of plates to the Polytechnic School at Paris. (See Lardner's *Handbook of Natural Philosophy*, Voltaic Electricity, p. 116.)

1809. SOEMMERING'S telegraph was invented in 1809. In "this telegraph galvanic electricity was used, and as many "wires were employed as there were letters or signals to "be denoted. The letters were designated by the decom- "position of water; an alarm was also added." (See Highton's *Electric Telegraph*, p. 39; also *Journal of the Society of Arts*, May 13, 1859, p. 453.)

1809. MR. CHILDREN, in 1809, formed a very large and powerful galvanic battery, upon the principle of Volta's *Couronne de tasses*. The most refractory substances were fused by it, such as platinum (a bar one-sixth of an inch square), the oxides of molybdenum, tungsten, uranium, titanium, cerium, and tantalium, the compound ore of iridium and osmium, also diamond, blue spinell, gadolinite, and zircon; ruby, sapphire, quartz, and silex were not affected. (See *Philosophical Transactions*, 1815, pp. 368–370; also *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 179, 222.)

1810. COXE'S telegraph was invented in 1810; he "proposed "the use both of the decomposition of water and also of "metallic salts." (See Highton's *Electric Telegraph*, p. 39.)

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1810. De Luc, in 1810, made a "dry" pile of tinned iron and gilded paper. (See De la Rive's *Treatise on Electricity*, Vol. II., p. 852.)

1812. Schilling, in 1812, proposed to blow up mines by galvanism. He ignited the powder by means of pieces of charcoal, and invented an "electro-conducting cord" to convey the electric fluid to the desired locality. (See *Journal of the Society of Arts*, July 22, 1859, p. 598.)

1812. Zamboni, in 1812, constructed a dry pile of paper discs, covered on one side with tin and on the other with peroxide of manganese. (See De la Rive's *Treatise on Electricity*, Vol. II., p. 852.)

1812. Ritter, about the year 1812, constructed his "secondary "pile." This instrument consists of alternate discs of copper and moistened card, and is capable of receiving a charge from a voltaic pile, and of thence producing the physical, chemical, physiological effects obtained from the ordinary pile. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 206.)

1813. Sir Humphrey Davy, about the year 1813, discovered the convective discharge between charcoal or carbon electrodes, called "the voltaic arc." The galvanic battery of the Royal Institution, consisting of 2000 pairs of zinc and copper, each having a surface of 32 square inches, and charged with acidulated water, was used to produce this phenomenon. The discharge took place through more than 4 inches of air, and 6 or 7 inches of vacuous space. "When any substance was introduced into this arc, "it became incandescent; platinum melted in it like wax "in the flame of a candle; sapphire, magnesia, lime,—all "the most refractory substances,—entered into fusion. "Fragments of diamond, points of carbon and of plum-"bago, disappeared rapidly, and seemed to evaporate in "this focus, without appearing to undergo previous "fusion." (See Davy's *Elements of Chemical Philosophy*, pp. 152–154; also De la Rive's *Treatise on Electricity*, Vol. II., pp. 282, 283; also *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 176, 178, and 222.)

Mr. J. R. Sharpe, of Doe Hill, near Alfretton, early in
1813. February, 1813, "devised a *voltaic* electric telegraph, which "he exhibited to the Lords of the Admiralty, who spoke

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"approvingly of it, but added, that as the war was over, "and money scarce, they could not carry it into effect." (See *Repertory of Arts*, 2nd series, Vol. XXIX., p. 23; also *Saturday Review*, August 21, 1858, p. 190.)

1815. Dr. Wollaston, in 1815, invented his galvanic battery. Dilute sulphuric acid was the exciting solution, a plate of copper was placed on each side of the zinc, and the whole was arranged in a trough composed of a number of cells. By attaching the plates to a rod, the whole of them might be lifted out of the liquid at once. (See Highton's *Electric Telegraph*, p. 14.)

Wollaston's celebrated thimble battery apparatus
1815. was constructed in 1815. It consisted of a flattened silver thimble, in which a zinc plate was fixed by sealing wax. This galvanic battery ignited a fine platinum wire by immersion in an aqueous solution of only one-fiftieth part of sulphuric acid. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 180, 181, and 222.)

1816. Mr. F. Ronalds invented his electric telegraph in 1816. Tension electricity was employed. "The wires used were "laid under-ground as well as suspended in the air. A pith-"ball electrometer, hung before a clock movement, enabled "the letters on a dial to be read off." (See Highton's *Electric Telegraph*, p. 39.)

1818. Dr. A. Ure, in 1818, submitted the body of a man who had been hanged, immediately after the execution, to the action of a galvanic battery of 270 pairs of copper and zinc plates. One of the electrodes was, by means of an incision, placed in contact with the spinal marrow; whilst the other was applied to the sciatic nerve, which had also been laid bare. Immediately all the limbs of the body were agitated by convulsive movements, and a wonderful likeness to the action of various organs of the body in life was produced, much to the terror of the spectators. (See De la Rive's *Treatise on Electricity*, Vol. II., pp. 489, 490; also *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 197.)

Professor Oersted, of Copenhagen, in a work published in 1807, proposed "to try whether electricity, in its latent "state, will not affect the magnetic needle;" and, at the
1819. close of the year 1819, he found that, "that end of the

A.D. "needle which is situated next to the negative side of the" [galvanic?] "battery, or towards which the current of positive electricity is flowing, immediately moves to the westward." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 1; also *Library of Useful Knowledge*, Electro-magnetism, p. 4.)

1819. HARE's "calorimotor" was constructed in 1819. In this galvanic battery the zinc plates were in flat copper cases. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 222; also Gmelin's *Handbook of Chemistry*, Vol. I., pp. 409, 410.)

1820. M. AMPÈRE, at a meeting of the Royal Academy on September 18, 1820, proved that the voltaic pile itself acted in the same manner on the magnetic needle as the connecting wire, and produced to the meeting a "galvanometer." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 5.)

1820. M. AMPÈRE, on September 25, 1820, announced the "fact of the attraction and repulsion of two wires connecting the poles of a" [galvanic?] "battery; and showed that the magnetic needle which had previously been used to prove the magnetic attractions and repulsions of the wire, could be replaced by another connecting wire like the first." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 5.)

1820. M. ARAGO, on September 25, 1820, "stated to the Royal Academy of Sciences, that he had ascertained the attraction of iron filings by the connecting wire of the" [galvanic?] "battery, exactly as by a magnet." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 6.)

1820. M. ARAGO, about the end of September, 1820, magnetized a sewing needle permanently by the galvanic current. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 6.)

1820. M. AMPÈRE, in September 1820, found a spiral or helical arrangement of the galvanic conducting wire most advantageous in magnetizing needles. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 6.)

1820. M. BOISGERAUD, on October 9, 1820, read a paper to the Royal Academy of Sciences, in which he proposed to

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ascertain the conducting power of different substances by placing them in the galvanic circuit together with Ampère's galvanometer. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 6.)

1820. M. AMPÈRE, on October 30, 1820, read an account to the Royal Academy of his method of proving the action of terrestrial magnetism upon galvanic currents. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism p. 7.)

1820. MM. BIOT and SAVART, on October 30, 1820, read a memoir to the Academy of Sciences in which it was demonstrated by oscillations of the magnetic needle, that the action of a galvanic conducting wire upon it (the needle) was "in "the inverse ratio of the simple distance." (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, pp. 4 and 7.)

1820. M. ARAGO, on November 6, 1820, announced that common or static electricity produced the same effects in magnetizing iron and steel as voltaic electricity. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 7.)

1820. AMPÈRE, on November 6, 1820, perfectly imitated a magnet by a helical galvanic conducting wire. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, pp. 7, 8.)

1820. SCHWEIGGER, in 1820, invented his galvanometer. (See *Encyclopædia Britannica*, 7th edition, art. Voltaic Electricity, p. 687.)

1820. Sir HUMPHREY DAVY, about the close of the year 1820, caused the rotation of an arc of electric light, by the proximity of the poles of a powerful permanent magnet. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, pp. 9, 10.)

1820. AMPÈRE invented his telegraphic arrangement in 1820. He "employed the magnetic needle, the coil of wire, and "the galvanic battery, and proposed the use of as many "wires as letters or signals to be indicated." (See Highton's *Electric Telegraph*, p. 39.)

1820. Sir WILLIAM SNOW HARRIS, in 1820, supplied sea-going vessels with lightning conductors. (See *Encyclopædia Britannica*, 8th edition, art. Electricity, p. 610.)

1820. BOHNENBERGER, in 1820, invented his electroscope.

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This instrument consists of a gold leaf suspended between the opposite poles of two dry piles; it is thus made not only to show the presence but also the kind of electricity possessed or developed by the body under examination, and is extremely sensitive in its indications. (See Noad's *Manual of Electricity*, p. 30; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 54–56.)

1821. FARADAY, in 1821, discovered the electro-magnetic rotative force developed in a magnet by a wire conducting galvanic electricity, and in a conducting wire by a magnet. He also demonstrated the ability of terrestrial magnetism to rotate a conducting wire. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 12.)

1821. Professor CUMMING, in April, 1821, invented a galvanometer in which a conducting wire was disposed in a circle or square of two or more coils, and the terrestrial direction of the needle (placed within the coils) was neutralized. In certain experiments he found that the tangent of the needle's deviation varied inversely as the distance of the conducting wire from the magnetic needle; also that, when the battery plates were placed at different distances from one another, the "tangent of deviation varied inversely as "the square root of the distances of the plates." Professor CUMMING, with the assistance of Dr. CLARKE and Mr. LUNN, produced "electro-magnetic effects from the "electricity of the atmosphere, by the usual apparatus, an "electrical kite." (See the *Transactions of the Cambridge Philosophical Society*, 1821; also *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, pp. 14, 15.)

1821. HARE'S "deflagrator" was constructed in 1821. This galvanic arrangement consisted of 80 coils of zinc and copper plates immersed in 80 separate vessels. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 176 and 222; also Gmelin's *Handbook of Chemistry*, Vol. I., pp. 409, 410.)

1823. M. SEEBECK discovered thermo-electricity in 1823. His first experiment was as follows:—A kind of arc was made of a plate of copper soldered to a bar of bismuth, in the interior of which a magnetic needle was pivoted; a deflection of the needle was produced by heating either of the soldered junctions. (See De la Rive's *Treatise on Electricity*, Vol. II., p. 535.)

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1823. Professor CUMMING, in 1823, ascertained that the unequal distribution of heat was the cause of thermo-electricity, and made a table of positive and negative thermo-electrics. About this period VAN ZUYLEN, Dr. VAN BEEK, and Professor MOLL, of Utrecht, extended Seebeck's experiments. (See *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, pp. 20–26; also the *Transactions of the Cambridge Philosophical Society*, 1823.)

1823. PEPYS, in 1823, constructed the galvanic battery for the London Institution. It was formed of a single pair of plates (copper and zinc), coiled like a double ribbon round a wooden cylinder, and prevented from coming into contact by means of horsehair ropes. (See *Practical Mechanic and Engineer's Magazine*, February 1842, p. 191; also *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, pp. 176 and 222.)

1824. Sir HUMPHREY DAVY, in 1824, applied the principles of galvanic electricity to prevent the corrosion of the copper sheathing of ships by sea water. Strips of zinc were affixed to the copper sheathing for this purpose; the copper was thereby protected at the expense of the zinc, but, in practice, sea-weed and shell-fish were found to adhere to the protected surface. (See *Encyclopædia Metropolitana*, Vol. IV., art. Galvanism, p. 222; also Bakewell's *Electric Science*, p. 35.)

1824. DE LA RIVE described the sine galvanometer in 1824. (See De la Rive's *Treatise on Electricity*, Vol. I., p. 334.)

1824. Professor BARLOW, in 1824, established the fact that the galvanic fluid in a conducting wire acts on the magnetic fluid in a magnetized needle with a force varying inversely as the square of the distance; he also proved that magnetic poles tend to place themselves at right angles to electric poles, and *vice versâ*, by the action of a tangential force. (See *An Essay on Magnetic Attractions*, 2nd edition, 1824; also *Encyclopædia Metropolitana*, Vol. IV., art. Electro-magnetism, p. 15.)

1826. POHL, about the year 1826, made the following galvanic arrangement:—"One zinc and seven copper plates are "separated from one another by seven layers of a moist "conductor which does not surround them, but merely

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1826. Sir HUMPHREY DAVY, in his Bakerian Lecture in 1826, stated that "zinc in amalgamation with mercury is positive "with respect to pure zinc" in a galvanic arrangement. (See Sturgeon's *Annals of Electricity, Magnetism, and Chemistry*, Vol. I., January 1837, p. 81.)

1826. M. LEOPOLD NOBILI of Reggio, in the year 1826, discovered metallo-chromy. This phenomenon is known by the name of "Nobili's rings," and is produced by the electrolysis of a solution of acetate of lead, using a platinum plate as a positive pole and a platinum wire as a negative pole. The deposit takes place on the positive plate, and consists of concentric colored rings of peroxide of lead. Mr. GASSIOT used for this experiment a perforated card placed over a polished steel positive plate, and a negative plate of copper covering the whole. (See Sturgeon's *Lectures on Galvanism*, pp. 197, 198.)

1827. OHM, in 1827, put forward the following celebrated formulæ relating to the *quantity* of the galvanic current:—"1. *For a conductor into whose extremities the two electricities flow with a given tension:* Let A be the electrical "tension; K the conducting power of the wire or other "conductor; w the surface of its transverse section; L its "length; Q the quantity of the current, then $Q = \frac{A K w}{L}$."
"2. *For a simple galvanic circuit:* Let A be the electro-"motive power of the circuit (or the tension?), R the "resistance which the current meets with in the circuit "itself. This is the resultant of the following individual "resistances:—*a.* Resistance of the two metallic plates

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"which the current has to traverse;—*b*. Resistance of the "liquid through which, according to the ordinary view, "the current passes." "To this FECHNER and POGGENDORFF add *c*: the resistance of transition,—*i. e.* the resistance which exists to the passage of the electric current "from the metal to the liquid, and conversely. Also, let "*r* be the resistance of the conductor which unites the two "metals, and Q the quantity of the electric current which "enters it; then $Q = \frac{A}{R+r}$; therefore $A = Q\,(R+r)$."
"3. *For the galvanic battery*: *n* denoting the number of "united simple circuits, $Q = \frac{nA}{nR+r}$." (See Gmelin's *Handbook of Chemistry*, Vol. I., pp. 414, 415.)

1827. M. SAVARY, in 1827, pointed out that the intensity and even the direction of the magnetization produced upon a steel needle by a discharge of frictional electricity transmitted through a rectilinear wire, depends upon the distance of the needle from this wire; also that the magnetic intensity does not diminish as the distance from the wire increases, but that there are points of maximum and minimum intensity. He produced similar results by discharges of successively increasing intensity through a helix. M. Savary found that insulated conducting (but non-magnetic) envelopes to the needle, placed within the helix and insulated from it, diminished the magnetizing power of the helix. (See De la Rive's *Treatise on Electricity*, Vol. I., pp. 281–287, also Vol. II., p. 889.)

1827. Sir WILLIAM SNOW HARRIS, in 1827, invented the thermo-electrometer. (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 89.)

1828. Mr. KEMP, in 1828, employed fluid amalgam of zinc in galvanic batteries. (See Sturgeon's *Annals of Electricity, Magnetism, and Chemistry*, Vol. I., January 1837, pp. 81–88.)

1828. Dr. FABRÉ PALAPRAT, in 1828, published a translation of a work of LABAUME. The medical effects of electricity are brought about in this instance by galvanism. Dr. Fabré Palaprat "employed a platinum wire heated by a "voltaic battery, in order to produce moxas." (See De

A.D. la Rive's *Treatise on Electricity*, Vol. III., pp. 589 and 687.)

1828. Mr. GREEN, in a work published in 1828, investigated the subject of the distribution of electricity mathematically, and proved that an infinite number of forms of conductors may be invented so that the distribution of electricity in equilibrium may be expressed in finite algebraic terms. (See *Encyclopædia Britannica*, 8th edition, art. Electricity, pp. 533, 534.)

1828. TRIBAOILLET, in 1828, invented his electric telegraph; it "required but one wire, and this was buried in the earth. "A galvanic battery and a galvanoscope were employed." (See Highton's *Electric Telegraph*, p. 39.)

1829. BECQUEREL, in 1829, made public a double-fluid galvanic battery consisting of copper, a salt of copper, dilute sulphuric acid or sulphate of zinc, and zinc. (See *Practical Mechanic and Engineers' Magazine*, September 1842, p. 484.)

1829. BECQUEREL, in 1829, used membranous diaphragms in voltaic batteries. He also used porcelain clay, wetted with a solution of sea salt, and plaster of Paris. (See *Practical Mechanic and Engineers' Magazine*, November 1842, p. 43.)

1830. Mr. STURGEON, in 1830, published his method of using amalgamated rolled zinc plates as positive plates in galvanic batteries. His cast-iron single-fluid galvanic battery was invented about this time. (See Sturgeon's *Lectures on Galvanism*, pp. 135–137.)

1830. Mr. FOX of Falmouth, in 1830, published his researches respecting the electricity of metalliferous veins. (See *Philosophical Transactions*, 1830, p. 399.)

1830. Dr. RITCHIE, in 1830, put forward his torsion galvanometer. (See *Encyclopædia Britannica*, 7th edition, art. Voltaic Electricity, p. 688.)

1830. M. RAYER "introduced, since 1830, during his service at "the hospital of charity, a trough" [galvanic?] "battery, "and made it serve in th etreatment of all kinds of para-"lysis." (See De la Rive's *Treatise on Electricity*, Vol. III., p. 592.)

1831. Dr. FARADAY, in 1831, produced an electric spark by the sudden separation of a coiled keeper from a permanent magnet. He also, in 1831, found an electric current to

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exist in a copper plate rotated between the poles of a magnet. (See Bakewell's *Electric Science*, pp. 39, and 140, 141.)

1831. MM. Andral and Ratier, in 1831, published an article in the Dictionary of Medicine and Practical Surgery which gives a summary of the work of M. Andrieux on medical electricity. The various kinds of electricity are herein proposed as extremely powerful physical agents. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 591, 592.)

1831. Dr. Faraday, in 1831, discovered the existence of the electric current induced in a hollow coil of wire when a steel permanent magnet is introduced into or withdrawn from the coil. An electro-magnet was afterwards substituted for the permanent magnet with even greater success. (See Bakewell's *Electric Science*, p. 39.)

1831. Professor Henry of Princeton, U.S., in 1831, suggested the application of electro-magnetic force to motive power. (See *Encyclopædia Britannica*, 7th edition, art. Voltaic Electricity, p. 687.)

1832. Schilling invented his electric telegraph in 1832. He "employed five magnetic needles and had also a mechanical "alarum." In another telegraph he only used one wire and one needle. (See Highton's *Electric Telegraph*, p. 39.)

1832. Schilling, in 1832, placed the telegraph magnetic needles vertical. (See Highton's *Electric Telegraph*, p. 137.)

1832. Schilling, in 1832, used a weight which was caused to fall by a current of electricity to sound a bell. (See Highton's *Electric Telegraph*, p. 137.)

1832. Dr. Botto of Turin, in 1832, made a thermo-electric battery of platinum and iron. (See Noad's *Lectures on Electricity*, p. 426.)

1832. M. Pixii, in 1832, constructed his magneto-electric machine. In this arrangement a horseshoe permanent magnet rotated in front of a coiled keeper. (See Highton's *Electric Telegraph*, p. 17; also De la Rive's *Treatise on Electricity*, Vol. I., p. 373.)

1832. Salvator Dal Negro, in November 1832, published a paper in which he explained the method adopted by him of applying electro-magnetism to move machines. (See *Practical Mechanic and Engineers' Magazine*, November 1842, p. 48.)

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1832. Dr. SCHULTHESS, in December 1832, delivered a lecture before the Philosophical Society of Zurich, in which he asks, "Whether such a power as that which is obtained by interrupting the electric current, and then restoring it, could "not be applied with advantage in mechanical science;"
1833. and in January 1833, he exhibited before the Mechanics' Society a machine in which this had been so far accomplished. (See *Practical Mechanic and Engineers' Magazine*, November 1842, p. 48.)

1833. Mr. SAXTON, in 1833, submitted his magneto-electric machine to the British Association; the coils rotate in front of the poles of a fixed magnet. (See Highton's *Electric Telegraph*, p. 17.)

GAUSS and WEBER invented their electric telegraph in
1833. 1833. "One wire and one needle only were needed. The "power employed was magneto-electricity." (See Highton's *Electric Telegraph*, p. 39.)

1833. THOMAS DAVENPORT, in 1833, suggested electro-motion. (See *Encyclopædia Britannica*, 7th edition, art. Voltaic Electricity, p. 687.)

1833. STURGEON, in 1833, exhibited an electro-magnetic engine which was capable of pumping water, sawing wood, and performing other mechanical operations. (See Dodd's *Industrial Applications of Electricity*, p. 8.)

1833. M. MARIANINI, in 1833, relates a number of cases of paralysis treated by voltaic electricity. The application is by shocks, which are made to pass through the affected part, sometimes in one direction and sometimes in the opposite. In one case cited, a battery of from 58 to 75 pairs was employed. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 589, 590.)

1834. Dr. FARADAY, in 1834, demonstrated the definite nature of electro-chemical or electrolytic decomposition, and showed that the chemical equivalents of bodies were also their electro-chemical equivalents; he also discovered that the chemical power of an electric current is in direct proportion to the quantity of electricity that circulates. (See Faraday's *Experimental Researches in Electricity*, 7th series, section 7; also *Philosophical Transactions*, 1834; also Bakewell's *Electric Science*, pp. 124–127.)

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1834. Dr. FARADAY, in 1834, established the principle that the quantity of electricity evolved from a galvanic battery depends upon the size of the plates, and the intensity of the electric current upon the number of pairs. (See Faraday's *Experimental Researches*, 8th series, paragraph 991; also Dr. Golding Bird's *Natural Philosophy*, p. 227.)

1834. Dr. FARADAY, in 1834, applied the voltameter to test the quantity of a voltaic current. (See *Philosophical Transactions*, 1834, pp. 704–741.

1834. Sir WILLIAM SNOW HARRIS, between the years 1834 and 1839, applied the principle of his hydrostatic magnetometer to the electrometer. (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 85.)

1834. Sir WILLIAM SNOW HARRIS, in 1834, applied the common scale beam to measure electric forces. (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 86.)

1834. Professor WHEATSTONE, in 1834, found the velocity of electricity to be 288,000 miles in a second, upon the double-fluid theory of electricity, or upon the single-fluid theory 576,000 miles per second. "This fact was deduced by "catching in a mirror, whilst revolving on a horizontal "axis at the rate of 800 times in a second, three electrical "sparks produced by the discharge of an electrical jar in "an interrupted circuit, the interruptions being at each "end and in the middle of the conducting wire." In this experiment the centre spark fell out of the line of the other sparks by half a degree of the circle." (See Sir W. Snow Harris' *Rudimentary Electricity*, p. 123.)

Mr. HENRY BESSEMER, of Camden Town, about the
1834. year 1834, electro-deposited "copper on lead castings so as "to produce antique heads in relief for mantelpiece ornaments." (See *Encyclopædia Britannica*, 8th edition, art. Electrotypie, p. 627; also *Mechanics' Magazine*, February 1844, p. 73.)

1834. Professor JACOBI, in November 1834, laid before "the "Academy of Sciences of Paris, a note upon a new electro-"magnetic apparatus." (See *Practical Mechanic and Engineers' Magazine*, November 1842, p. 48.)

1834. Mr. E. M. CLARKE, in 1834, invented a magneto-electric machine in which coils rotate at the side of the magnet.

A.D. Different armatures were used for intensity and quantity currents. (See *Encyclopædia Britannica*, 7th edition, art. Voltaic Electricity, p. 693.)

1834. Dr. FARADAY, in December 1834, experimented on the induction of a galvanic current upon itself. Professor HENRY of Princeton, U. S., M. ABRIA, and M. WARTMANN also laboured in the same field of science. (See Faraday's *Experimental Researches in Electricity*, Vol. I., pp. 322–343; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 393–402.)

1835. FORBES, in 1835, employed a thermo-multiplier to measure the heat caused by the concentration of moonlight 3000 times; the result was that no trace of heating was observed. (See *London and Edinburgh Philosophical Magazine*, Vol. VI., p. 138; also Gmelin's *Handbook of Chemistry*, Vol. I., p. 166.)

1836. M. SCHOENBEIN, in 1836, made his celebrated investigations on the negative polarity induced upon iron, which renders it unattackable by acids or "passive." Dr. FARADAY and M. BEETZ immediately followed up these experiments, and proved that passive iron was covered with a pellicle of oxide. Mr. ANDREWS demonstrated the passivity of bismuth, M. BEETZ that of nickel, and M. NICKLÈS that of cobalt. Heat, and electrolytical and chemical action under certain circumstances, are the means of rendering the above metals passive. (See Faraday's *Experimental Researches in Electricity*, Vol. II., pp. 234 and 239; and De la Rive's *Treatise on Electricity*, Vol. II., pp. 738–744.)

1836. Sir WILLIAM SNOW HARRIS, in 1836, published a description of "the bifilar balance electrometer," invented by himself. (See *Philosophical Transactions*, 1836; also Sir W. Snow Harris' *Rudimentary Electricity*, p. 83.)

1836. Chevalier ANTINORI, of Florence, in 1836, "by con-" necting a thermo-electric battery with a helix of insulated "copper wire, about 500 feet in length, obtained on "breaking contact, a vivid spark from the induced or "secondary current produced by the passage of the pri-" mary thermo-electric current." (See Dr. Golding Bird's *Natural Philosophy*, p. 280.)

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1836. Professor DANIELL, in 1836, published an account of his "constant" galvanic battery in the Philosophical Transactions. In this double-fluid battery the elements are, copper, acid solution of sulphate of copper, dilute sulphuric acid, and amalgamated zinc; a copper cylinder surrounds a bolt of zinc. A battery of 70 cells fused titanium and heated 16 feet 4 inches of No. 20 platinum wire. (See *Encyclopædia Britannica*, 7th edition, art. Voltaic Electricity, pp. 669–671; also Gmelin's *Handbook of Chemistry*, pp. 393 and 421; also Bakewell's *Electric Science*, pp. 43, and 106, 107.)

Mr. MULLINS brought forward his "sustaining" galvanic
1836. battery in 1836. This double-fluid battery consists of copper, acid solution of sulphate of copper, solution of chloride of ammonium, and unamalgamated zinc; the zinc surrounds the copper. (See *Philosophical Magazine*, 1836, p. 283; also *Encyclopædia Britannica*, 7th edition, art. Voltaic Electricity, p. 671; also Gmelin's *Handbook of Chemistry*, Vol. I., p. 393; also *Practical Mechanic and Engineers' Magazine*, September 1842, pp. 484, 485.)

DE LA RUE published a description of his galvanic battery
1836. in 1836. This was a peculiar form of Daniell's battery in which all the cells could be filled at one time. (See *Philosophical Magazine*, 1836; also Smee's *Electro-metallurgy*, History, p. xviii.)

1836. Mr. DE LA RUE, in 1836, published the following remarks in reference to the properties of his modification of Daniell's galvanic battery:—" The copper plate is also " covered with a coating of metallic copper, which is con- " tinually being deposited; and so perfect is the sheet of " copper thus formed, that, being stripped off, it has the " counterpart of every scratch of the plate on which it is " deposited." This is interesting in relation to electro-metallurgy. (See *Philosophical Magazine*, 1836; also Smee's *Electro-metallurgy*, History, p. xviii.)

Messrs. TAQUIN and ETTIEYHAUSEN established their
1836. electric telegraph in Vienna in 1836. The wires were partly suspended in the air and partly buried in the earth. (See Highton's *Electric Telegraph*, pp. 39 and 57.)

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1836. MR. ANDREW CROSSE, in 1836, showed his electrical arrangements to Sir Richard Phillips and other members of the British Association. These arrangements consisted of 2500 voltaic pairs excited only by pure water, and principally employed to produce minerals artificially; also of one-third of a mile of exploring wire to collect atmospheric electricity, and suitable apparatus for its discharge and for carrying on gigantic experiments with it. Professor Sedgwick saw the atmospheric apparatus in the year 1819. Crosse also used a condenser or electrical battery, in which plates of mica separated the polar surfaces. (See Sturgeon's *Annals of Electricity*, &c., Vol. I., January 1837, pp. 135–145; also Noad's *Manual of Electricity*, pp. 257–259.)

1837. MR. ANDREW CROSSE, in 1837, found insects (the "electrical acarus") produced in his apparatus for electro-crystallization. (See Sturgeon's *Annals of Electricity*, &c., Vol. I., April 1837, pp. 242–244.)

1837. STEINHEIL, in 1837, made the counting of the number of motions of the magnetic needle the basis of his telegraphic alphabet. (See Highton's *Electric Telegraph*, p. 137.)

1837. STEINHEIL, in 1837, used wires suspended in the air, and buried in the ground, for an electric telegraph. (See Highton's *Electric Telegraph*, p. 137.)

1837. STEINHEIL invented his electric telegraph in 1837. "This telegraph required only one wire and one or two "magnetic needles. The power used was magneto-elec-"tricity. Steinheil had a printing telegraph as well as a "means of telegraphing by sounds produced by electric "apparatus striking bells." The signals of the printing or marking telegraph were made by furnishing the needles with small tubes containing ink; by the motions of the needles "dots were made on paper properly moved in front "of them by wound-up mechanism; one needle making "dots in one line, and the other needle making dots in a "line underneath the former." (See Highton's *Electric Telegraph*, pp. 39, and 57–60.)

1837. MASSON, in 1837, erected a telegraph at Caen, in which magneto-electricity was made to operate upon magnetic needles. (See Highton's *Electric Telegraph*, pp. 40, and 60–62.)

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1837. Dr. ANDREWS, in 1837, constructed a thermo-electric battery of platinum wires and fused salts. (See *London, Edinburgh, and Dublin Philosophical Magazine*, June 1837, Vol. X., p. 433.)

1837. M. BECQUEREL, in 1837, invented his electro-magnetic balance. By means of this instrument the proportional intensity of galvanic currents is ascertained, weights being placed in a scale pan attached to the moveable soft iron core of the electro-magnet sufficient to restore the equilibrium. (See Sturgeon's *Annals of Electricity*, &c., Vol. I., July 1837, pp. 398–404; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 339–341.)

1837. Dr. GOLDING BIRD, in 1837, by using a constant galvanic current of low tension, decomposed fluorides of silicon, and the chlorides of potassium, sodium, and ammonium; silicon [silicium?] was thus obtained in a metallic state, and potassium, sodium, and ammonium as amalgams. (See *Philosophical Transactions*, 1837, p. 37; also Dr. Golding Bird's *Natural Philosophy*, p. 240.)

Professor MORSE says that the idea of an electric telegraph occurred to him in 1832, but he did not test his
1837. telegraph until September 1837, and the first experiment was made October 2, 1837. In this telegraph a marking lever makes pricks on paper (a pen or pencil was at first used), the lever being actuated by an electro-magnet; one wire only is used. (See Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 75–79; also Highton's *Electric Telegraph*, pp. 60–63.)

1837. VAIL, in September, 1837, whilst making the Morse instrument, invented a single-wire printing electric telegraph. A type wheel is moved forward by a clockwork escapement, regulated by a pendulum, on the excitation of an electro-magnet; the paper is pressed against a type wheel, and an impression made of the letter then present. (See Highton's *Electric Telegraph*, pp. 63, 64.)

1837. Mr. STURGEON, in 1837, published his investigations relating to the thickness of iron suitable for electro-magnets. Some time previous to this date he discovered "that if a " bar of *soft iron* be surrounded with coils of wire, and an " electric current be transmitted in the same direction " through each convolution, that the soft iron bar instantly

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YOUNG'S single-fluid galvanic battery was invented in
1837. 1837. It consists of zinc and copper plates so arranged that a copper plate comes between two zinc plates, and a zinc plate between two copper plates; the pairs are interlaced. A mixture of dilute sulphuric and nitric acids is used to excite this battery. (See Gmelin's *Handbook of Chemistry*, Vol. I., p. 425; also *Practical Mechanic and Engineers' Magazine*, February 1842, p. 193.)

1838. MULLINS, in 1838, substituted sycamore porous cells (in double-fluid galvanic batteries) for animal membranes. (See Gmelin's *Handbook of Chemistry*, Vol. I., p. 422: also *Practical Mechanic and Engineers' Magazine*, September 1842, pp. 484, 485, and November 1842, pp. 43, 44.)

1838. Professor JACOBI, in 1838, "produced a vessel upon the "Neva worked by electro-magnets." (See *Abridgments of the Specifications relating to Marine Propulsion*, Part II., p. 144; also *Times* Newspaper, December 26, 1857, p. 9, col. 4; also *Practical Mechanic and Engineers' Magazine*, November 1842, p. 48.)

M. AMYOT'S proposal for an electric telegraph was made
1838. to the Académie des Sciences on July 2, 1838. In this telegraph it was intended to use a single current and a single needle, "which writes of itself on the paper," the paper being moved by clockwork. (See Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 84, 85.)

1838. Professor JACOBI first announced his "galvano-plastic" process in October, 1838. An allusion to it was published in this country in May 1839; the paragraph is as follows:— "He has found a method—if we understand our informant "rightly—of converting any line, however fine, engraved "on copper, into a relief by galvanic process." Jacobi says that his process is applicable to copper-plate engravings, medals, stereotype plates, ornaments, and to making calico-

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printing blocks and patterns for paper-hangings. (See Smee's *Electro-metallurgy*, History, p. xviii.; also *Athenæum*, May 4, 1839; also *Mechanics' Magazine*, May 11, 1839, and February 24, 1844, p. 118; also Gmelin's *Handbook of Chemistry*, Vol. I., pp. 502–510.)

1838. SCHWEIGGER, in his journal, in 1838, proposes the following modification of Soemmering's electric telegraph:—The use of two galvanic batteries, one weaker than the other, so as to vary the amount of gas evolved in a given time; he proposes also to vary the period of time of the evolution of the gases. The number of wires would be then reduced to two. Printing the letters by means of lamp-black paper, &c., was also suggested. (See Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 64, 65; also Highton's *Electric Telegraph*, pp. 48, 49.)

1838. MR. J. DANCER, of Liverpool, about 1838, used porous vessels of the thinnest unglazed biscuit ware for galvanic batteries. (See Dr. Golding Bird's *Natural Philosophy*, p. 229; also *Mechanics' Magazin* February 3, 1844, p. 76.)

1839. DR. WILLIAM O'SHAUGHNESSY, at Calcutta, in 1839, made experiments on a small scale to submerge an insulated electric conductor under water; the conductor consisted of copper wire coated with cotton thread saturated with pitch and tar. (See *Journal of the Society of Arts*, April 23, 1858, p. 351.)

M. VORSSELMAN DE HEER, on the 31st of January,
1839. 1839, exhibited an electro-physiological telegraph at a meeting of the Société de Physique of Deventer. Ten wires are used, and the operator's fingers receive shocks, the signal being determined by the fingers affected; it is also proposed to use secondary currents. (See Poggendorff's *Annalen*, Vol. XLVI., p. 513; also Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 90–95; also *Journal of the Society of Arts*, April 23, 1858, p. 358.)

1839. GROVE'S galvanic battery was invented in 1839. In this double-fluid battery the elements are platinum, nitric acid, dilute sulphuric acid, and amalgamated zinc. (See Gmelin's *Handbook of Chemistry*, Vol. I., pp. 391 and 422; also Noad's *Lectures on Electricity*, 3rd edition, p. 167.)

A.D. 1839. MR. T. SPENCER, about the year 1839, in galvanic batteries, substituted a brown packing paper porous cell for the ox-gullet of Daniell's battery: also Glauber's salt or sulphate of zinc for dilute sulphuric acid. (See Gmelin's *Handbook of Chemistry*, Vol. I., p. 422; also *Instructions for the Multiplication of Works of Art in Metal by Voltaic Electricity*, by Thomas Spencer, 8vo., Glasgow, 1840, pp. 59, 60.)

1839. Mr. T. SPENCER, on May 8, 1839, gave notice to read a paper on the "Electrotype process" to the Liverpool Polytechnic Society: this paper was read September 12, 1839. The experiments resulting in this discovery were begun in September, 1837. The invention comprises the following points:—1st. "To engrave in relief on a plate of copper:" the plate was etched by the ordinary etching process, and copper electro-deposited in the sunken lines, so as to stand out in relief. 2nd. "To deposit a solid voltaic plate, having "the lines in relief;" an electrotype cast is taken of an engraved plate; as the lines are sunken in the plate, they are in relief in the electro-cast. 3rd. "To procure fac-"similes of medals, &c.;" according to one method an electro-mould and electro-cast from that mould was taken: and according to another method a leaden mould was taken by pressure, and an electro-cast from that mould. 4th. To obtain "a voltaic impression from a plaster or clay "model;" the object was rendered conducting by means of "bronze powder" or gold leaf, and an electro-cast taken. 5th. "To obtain any number of copies from an already-"engraved copper-plate;" a copper-plate is engraved in the usual way, an impression of it is obtained in sheet lead by pressure, and an electro-cast taken from the lead. It is besides stated that iron castings may be preserved from the weather by an electro-coat of copper. The single-cell process is used. The subject was afterwards brought before the meeting of the British Association at Birmingham in 1839, and numerous specimens were exhibited, thus attracting the attention of the public to this application of electric force. (See *An Account of some Experiments made for the Purpose of ascertaining how far Voltaic Electricity may be usefully applied to the purpose of Working in Metal*, by Thomas Spencer, Liverpool, 1839; also *Mechanics' Ma-*

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gazine, November 23, 1844, p. 367; also Bakewell's *Electric Science*, p. 176.)

1839. Mr. C. J. JORDAN, on May 22, 1839, communicated the results of his electro-metallurgical experiments to the Editor of the "Mechanics' Magazine," and the letter appeared in that periodical on June 8, 1839. These experiments were begun in the commencement of the summer of 1838, and they were made "with a view of obtaining impressions from "engraved copper plates, by the aid of galvanism." A single-cell arrangement was employed to obtain an electro-cast from an engraved copper plate. The application of electro-metallurgical processes to various useful purposes was also suggested. (See *Mechanics' Magazine*, June 8, 1839; also *Jordantype, otherwise called "Electrotype,"* by Henry Dircks, London, 1842; also *Contributions towards a History of Electro-metallurgy*, deposited in the Patent Office Library, January 1859, by Henry Dircks).

1839. Colonel PASLEY, in 1839, proposed to the Admiralty to blow up the wreck of the *Royal George*, which had been submerged for sixty years at Spithead, by electro-blasting. Brass guns of sufficient value to pay for all Colonel Pasley's operations were recovered. (See Dodd's *Industrial Applications of Electricity*, pp. 14, 15.)

1839. Dr. GOLDING BIRD, in 1839, noticed that the platinum plates of a voltameter, already polarized by connection with a galvanic battery, when connected with an amalgamated zinc plate immersed in the acidulated water, would evolve hydrogen in unequal volumes, one nearly twice as much as the other. (See *Philosophical Magazine*, 1839; also Dr. Golding Bird's *Natural Philosophy*, pp. 238, 239.)

Professor WHEATSTONE, at the commencement of the
1840. year 1840, invented his "chronoscope" or instrument for measuring the duration of small intervals of time; this instrument has been applied to measure the velocity of projectiles. It is composed of a clock movement, set free at the moment of the ball's exit from the gun, and stopped when the ball reaches the target. For this purpose a wire in the galvanic circuit, at the gun's mouth, is broken at the instant the ball passes out of the gun; the circuit is completed when the ball reaches the target. The galvanic current acts on the clock movement by means of an electro-

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1840. Mr. MURRAY, in January 1840, used plumbago to make non-conducting surfaces conducting, so as to enable metallic copper to be electro-deposited upon them. (See Smee's *Electro-metallurgy*, History, pp. xxi. xxii.)

1840. DE LA RIVE, in 1840, made known the process of electro-gilding employed by him in 1828. Platinum and silver wires were electro-gilt "by employing them as negative "electrodes in a solution of chloride of gold." (See De la Rive's *Treatise on Electricity*, Vol. III., p. 546.

1840. Professor JACOBI, in 1840, used a modification of Daniell's constant galvanic battery, consisting of a lead or copper cylinder, with thin earthenware to separate the fluid elements; the zinc is in the centre. (See Gmelin's *Handbook of Chemistry*, Vol. I., p. 422.)

1840. Mr. WILLIAM ARMSTRONG, of Newcastle, in 1840, successfully experimented upon the electricity of effluent high-pressure steam; the result was the hydro-electric machine. FARADAY proved that the electrical excitement is due to the friction of the particles of water against the sides of the jet whence the steam issues. (See Bakewell's *Electric Science*, p. 45.)

1840. SMEE'S galvanic battery was invented in 1840. In this single-fluid arrangement the elements are, platinized silver, dilute sulphuric acid, and amalgamated zinc. (See Smee's *Electro-metallurgy*, p. 18; also Gmelin's *Handbook of Chemistry*, p. 419.)

1840. MASON, in 1840, employed the battery process in electrotypy. (See *Proceedings of the Electrical Society*, April 1840, p. 203; also Walker's *Electrotype Manipulation*, Part I., p. 22.)

1840. Mr. ANDREW CROSSE, in 1840, imitated constant and intermittent springs, by passing the current from a constant galvanic battery through moistened pipe-clay in a garden pot placed in a basin full of water. (See Noad's *Manual of Electricity*, pp. 390–392.)

1840. M. DE RUOLZ, on December 19, 1840, took out a patent [in France?] for electro-gilding. He uses the fol-

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lowing solutions:—The double chloride of gold and sodium dissolved in soda, chloride of gold dissolved in yellow ferrocyanide of potassium, sulphuret of gold dissolved in neutral sulphuret of potassium. (See De la Rivé's *Treatise on Electricity*, Vol. III., pp. 549–551.)

1841. M. ABRIA, in 1841, proved that, in magnetizing a steel needle by an electro-dynamic helix, whatever be the length of the needle, provided it is not longer than the helix, its poles are always placed at the two extremities of the part inserted, and that the portion which is outside the helix is not magnetized. He also investigated the influence that the length and diameter of the needles, and the length and diameter of the helix, exerted over the magnetic intensity, and found that the longer a needle or helix was in comparison to its diameter, the greater the magnetic intensity (See De la Rive's *Treatise on Electricity*, Vol. I., pp. 287–289; also Vol. II., p. 889.)

1841. M. DE RUOLZ, in 1841, electro-deposited brass from the cyanides of zinc and copper dissolved together in a solution of cyanide of potassium. (See Gore's *Theory and Practice of Electro-deposition*, p. 62; also Walker's *Electrotype Manipulation*, last edition.)

1841. Professor GROVE, in 1841, read a paper at a meeting of the London Electrical Society, in which he proposed to etch daguerreotypes by the voltaic current. The solution used consists of moderately dilute hydrochloric acid. (See *Practical Mechanic and Engineers' Magazine*, October 1841, p. 34; also Smee's *Electro-metallurgy*, p. 336.)

1841. Mr. ALFRED SMEE, in 1841, published the results of his electro-metallurgical experiments, and enunciated the laws regulating the character of the metallic deposit. He electro-deposited the following metals from their solutions in the reguline form:—Platinum, gold, palladium, iridium, rhodium, silver, nickel, copper, zinc, cadmium, iron, lead, and antimony. Many applications of electro-metallurgy are set forth and suggested in the three editions of Mr. Smee's "Electro-metallurgy." (See Smee's *Elements of Electro-metallurgy*, 1st edition, 8vo., London, 1841, also the 2nd and 3rd editions of the same work.)

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1842. Professor MORSE, in 1842, gave it as his opinion that Europe and America might be connected by means of the electric telegraph. (See Whitehouse's pamphlet, *The Atlantic Telegraph*, pp. 3, 4.)

1842. Mr. J. P. JOULE, in 1842, made some remarkable researches on the electric origin of the heat of combustion. (See *British Association Report*, 1842, p. 31.)

1842. BUNSEN'S double-fluid galvanic battery was invented in 1842. Its elements are, coke, nitric acid, dilute sulphuric acid, and amalgamated zinc; a hollow cylinder of coke is made to surround a rod of amalgamated zinc. BONIJOL places a hollow cylinder of zinc round a solid cylinder of coke. (See Gmelin's *Handbook of Chemistry*, pp. 392 and 423; also De la Rive's *Treatise on Electricity*, Vol. I., pp. 45–47.)

1842. GROVE'S gas battery was invented in 1842. This arrangement consists of platinized platinum plates arranged in pairs, one plate of each pair being in contact with oxygen gas and acidulated water, the other in contact with hydrogen and the same acidulated water; the pairs are connected as in ordinary galvanic batteries, and the gases are absorbed during the action of the battery. (See De la Rive's *Treatise on Electricity*, Vol. II., pp. 723-733.)

1842. MM. MASSON and BREGUET, in 1842, constructed an electro-dynamic coil, with which they obtained a spark between the poles in vacuo without previous contact, the apparatus being in connection with a galvanic battery. (See Noad's *Manual of Electricity*, pp. 726, 727.)

1842. Mr. ROBERT DAVIDSON, in September 1842, tried his electro-magnetic locomotive upon the Edinburgh and Glasgow Railway. It consisted of horseshoe electro-magnets opposed radially to keepers fixed on the driving wheel shafts parallel to their axes. Mr. Davidson was engaged in the construction of electro-magnetic engines in 1837. (See *Practical Mechanic and Engineers' Magazine*, November 1842, pp. 49–52.)

ROBERTS' single-fluid galvanic battery, and the method
1842. of using it for blasting purposes were made public in 1842. The battery consists of cast iron and amalgamated zinc plates placed interlacing in a frame; the exciting liquid is dilute

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sulphuric acid. The whole apparatus for blasting consists of the battery, conducting wires, cartridges, and galvanometer to test the cartridges; the conducting wires are insulated from one another and twisted so as to form one rope, they terminate in the cartridge, and have fine steel "balance "wire" stretched across their ends, their other terminations are connected to the battery poles. To use this apparatus the cartridge is placed in the centre of the charge of powder and the battery connection made, when the steel wire becomes red hot, fires the cartridge, and explodes the charge of powder. (See *Practical Mechanicand Engineers' Magazine*, November 1842, pp. 45–48.)

1842. M. MATTEUCCI, in 1842, wrote upon the electric current proper to the frog, and determined the conditions of its development and its course. (See *British and Foreign Medico-Chirurgical Review*, January 1854, pp. 134–137.)

1842. WÖHLER and WEBER, in 1842, used a double-fluid galvanic battery in which iron was the positive as well as the negative plate; the positive plate was immersed in dilute and sulphuric acid, the negative plate in strong nitric acid, and thus kept in a passive state. (See *Annalen de Chemie and Pharmacie*, Vol. XXXVIII, p. 307; also Gmelin's *Handbook of Chemistry*, Vol. I., p. 423.)

1842. MOSER, in 1842, discovered that if two bodies are in contact, or very near together, they impress their image upon each other. KARSTEN succeeded, a short time after Moser's discovery, in producing similar figures under analogous circumstances, making use of frictional electricity. A glass plate, placed between a coin and metal plate, which respectively receives and conveys away the electric fluid, has the image of the coin. This image appears, in its most minute details, on being breathed upon. (See De la Rive's *Treatise on Electricity*, Vol. II., pp. 174–180.)

Mr. CUBITT planned the destruction of the Round Down Cliff by electro-blasting. This event took place, January
1843. 26, 1843. (See Noad's *Lectures on Electricity*, pp. 191-193.)

1843. M. DUBOIS REYMOND, in January 1843, announced the following law of animal electricity (the so-called "frog current"):—"When any point of the longitudinal section of

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1843. Mr. J. P. Joule made public his galvanometer in 1843. This instrument consists of a pivoted magnetic needle, which can be surrounded by coils respectively adapted to the measurement of the galvanic current under examination. (See *Practical Mechanic and Engineers' Magazine*, October 1843, pp. 39, 40.)

1843. MM. Bréguet and Konstantinoff, in 1843, constructed a chronoscope depending on the same principles as that of Professor Wheatsone; a rotating cylinder with styles is, however, substituted for the clock movement. (See Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 138, 139, and 150; also De la Rive's *Treatise on Electricity*, Vol. III., pp. 484, 485.)

1843. Professor Wheatstone, in 1843, proposed to register observations of meteorological instruments. The electric circuit is completed by the contact of mercury with a platinum wire placed in the tube of the instrument. In this way the meteorological condition of space may be observed by means of a balloon, or the instruments may be buried in the depths of the earth. The "thermometer-telegraph" is said, in a Report addressed to the British Association to act perfectly at the distance of many miles. (See Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 128–132.)

1843. Mr. Nott, on August 17, 1843, read a description of his rheo-electric machine to the British Association. It consists of a plate of glass and a plate of resin; the rubbers to these plates being connected, "a complete circle is formed "as in the voltaic pile." (See *Practical Mechanic and Engineers' Magazine*, September 1843, pp. 469, 470.)

1843. Mr. G. Little, in 1843, described an "electro-magnetic "motion." A metallic ball is caused to move in a circular metallic railway by the alternate tipping of the sole plate; the rails are divided at opposite points of the circle, and caused to complete the electric circuit differently, according to the position of the ball on one or other semicircle; the

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tipping of the sole plate is caused by horseshoe electro-magnets alternately excited by the above-described means. (See *Practical Mechanic and Engineers' Magazine*, August 1843, pp. 435, 436.)

1844. Baron REICHENBACH, in 1844, investigated the action of electrical forces of all kinds upon "sensitives," and found that electrified bodies appeared to the "sensitives," in an absolutely dark room, to give forth luminous emanations. Other effects are described. (See Reichenbach's *Researches on Magnetism, Electricity, Heat, Light, Crystallization, and Chemical Attraction in their relation to Vital Force.* Translated and edited by Dr. Gregory, London, 1846.)

1844. Mr. GEORGE LITTLE, in 1844, described an "electro-"locomotive." It consists of an axle on which T-shaped magnets are placed; fixed horseshoe electro-magnets act upon these, and, by means of a commutator, produce rotation of the axle. (See *Practical Mechanic and Engineers' Magazine*, May 1844, p. 290.)

1844. M. POUILLET, about the year 1844, invented a chronoscope, having for its principle the deviation produced by a given battery upon a given galvanometer by various durations of completion of the galvanic circuit. (See Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 132–138; also De la Rive's *Treatise on Electricity*, Vol. III., pp. 485, 486.)

Mr. JOHN DANCER's electro-metallurgical experiments
1844. were not published till 1844, although they were made about the year 1838. Metallic copper was deposited on sheet copper with a letter D, cut from a printed bill, fastened on to it by varnish. An electro-cast of a stamp on a copper cylinder was also obtained. (See *Mechanics' Magazine*, February 3, 1844, pp. 76, 77.)

1845. SCHOENBEIN, in 1845, wrote upon ozone at the request of the British Association. This odorous principle is produced during the action of the electrical machine, manifested in thunder-clouds, developed in the electrolysis of water, and appears always to attend electric polarization. (See *Report of the British Association* for the meeting in 1845, p. 91; also De la Rive's *Treatise on Electricity*, Vol. II., pp. 469–480.)

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1845. M. Heider, in 1845, employed a platinum wire, heated by a voltaic battery, to cauterize the dental nerves. (See De la Rive's *Treatise on Electricity*, Vol. III., p. 687.)

1845. Professor William Thomson, in 1845, showed how the electric polarization is to be taken into account in the Leyden jar. (See *Encyclopædia Britannica*, 8th edition, art. Electricity, p. 534.)

1845. Mr. C. V. Walker, in 1845, by means of three Daniell's cells and a brass anode, electro-deposited brass from a strong solution of cyanide of potassium which had been sequentially electrolysed with a copper and zinc anode. Alloys of gold and copper, or gold and silver, may be electro-deposited by similar means. (See *British Association Report* for the meeting in 1845, p. 30.)

1845. Dr. Remak, in 1845, discovered that certain points favourable for the application of electricity to the human body "corresponded with the points of entrance of the "muscular nerves, and that the degree of contraction of a "muscle was proportioned exactly to the number of "motory nerve-fibres embraced by the current at its point "of application." (See Dr. Remak's *Ueber Methodische Electrisirung gelähmter Muskeln*, Berlin, 1845; also *The British and Foreign Medico-Chirurgical Review*, January 1859, p. 91, *et seq.*)

1846. Dr. Pring, in 1846, submitted to the Royal Society his process of electro-disruptive etching. The hardest steel is thereby engraved by the disruptive discharges passing between a metal tool and the face of the plate. A galvanic series, in connection with an electro-magnetic coil, is used, the plate being attached to one pole and the tool to the other pole of the arrangement. (See Smee's *Electro-metallurgy*, pp. 337, 338.)

1846. M. Crusell, of St. Petersburgh, in 1846, "conceived "the idea of cutting and cauterizing the tissues, by means "of a wire or a thin plate of platinum, rendered incan-"descent by a powerful electric current, by making them "act after the fashion of a saw, by means of a backward "and forward motion." (See De la Rive's *Treatise on Electricity*, Vol. III., p. 687.)

1846. Mr. Hearder, in 1846, constructed his electro-dynamic coil. By means of this apparatus, in connection with a

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galvanic battery and the condenser of M. FIZEAU, sparks can be obtained through an intervening space of air without previous contact. (See Noad's *Manual of Electricity*, pp. 727, 728.)

1847. Professor WILLIAM THOMSON, in 1847, advanced his singularly beautiful theory of electrical images and reflections. (See *Encyclopædia Britannica*, 8th edition, art. Electricity, p. 534.)

1847. Professor SILLIMAN, about the year 1847, successfully copied the iridescent colors of mother-of-pearl by the electrotype process. For this purpose a mould is taken of the shell in fusible metal, and an electro-cast from that mould. (See Smee's *Electro-metallurgy*, pp. 281, 282; also Timb's *Year Book of Facts*, 1847.)

1847. WERNER SIEMENS, in the summer of 1847, tried successfully a gutta-percha-covered copper wire on an electric telegraph line of from four to five English miles in length, viz., between Berlin and Gross-Beeren. (See *Journal of the Society of Arts*, April 23, 1858, p. 350.)

1847. Mr. E. LOOMIS, in a letter to Mr. Sabine, dated August 2, 1847, proposes to use Morse's "magnetic telegraph," to determine the difference of longitude between Philadelphia and Washington. (See Abbé Moigno's *Traité de Télégraphie Électrique*, pp. 124–126.)

1847,
1848. CHARLES V. WALKER, F.R.S., in 1847 and 1848, proposed and adopted underground wire insulated with gutta percha for electric telegraphs. (See Whitehouse's pamphlet, *The Atlantic Telegraph*, p. 4.)

1848. M. FOUCAULT, in 1848, constructed an electric light apparatus, in which the luminous point remains fixed; to effect this the carbons are moved by clock-work, which is liberated, by the armature of an electro-magnet included in the electric circuit, on the weakening of the electric current. M. BRETON's apparatus is similar to M. Foucault's, but instead of springs for approximating the carbons, weights and counterpoises are used; there is also a ratchet wheel and click movement instead of a detent employed to maintain the separation of the electrodes. In DUBOSCQ's apparatus the electrodes have a constant tendency to come into contact, the upper one by its weight, the lower by a

A.D. spiral spring tending to unwind an endless screw; during the passage of the current the regulating electro-magnet's lever armature gears into the endless screw and prevents the approach of the electrodes by intervening mechanism, but on the weakening of the current the force of the spring preponderates, moves the lower electrode, and revolves a barrel carrying a cord connected with the upper electrode; a pulley of variable diameter, which transmits motion to the barrel, enables the comparative motion of the electrodes to be accurately adjusted, the luminous point thus remains fixed under all circumstances. (See De la Rive's *Treatise on Electricity*, Vol. II., pp. 326–328, also Vol. III., pp. 310–315.)

1848. Dr. FARADAY, in 1848, showed that gutta percha has powerful insulating properties. "When rubbed it shows "negative electricity." (See *London and Edinburgh Philosophical Magazine and Journal of Science*, Vol. XXXII., p. 165; also Gmelin's *Handbook of Chemistry*, Vol. I., p. 313.)

1848. WERNER SIEMENS, in 1848, in the bay of Kiel, and in crossing the Rhine at Cologne and other rivers, successfully established subaqueous electric telegraph conductors. (See *Journal of the Society of Arts*, April 23, 1858, p. 351.)

1848,
1849. M. DUBOIS REYMOND, in 1848–9, published his researches in animal electricity. (See *British and Foreign Medico-Chirurgical Review*, January 1854, p. 126.)

1849. CHARLES V. WALKER, F.R.S., on January 10, 1849, made an experiment of submerging a gutta-percha-covered electric conductor in the open sea. "He attached two miles "of insulated wire, submerged in the sea, to the end of one "of the wires of the South Eastern Company's" [telegraphic?] "system at Folkestone, and spoke through it "to the Directors in London from the deck of the "steamer." (See Whitehouse's pamphlet, *The Atlantic Telegraph*, p. 4.)

1849. WERNER SIEMENS, in 1849, observed the electric charge in underground telegraphic line wires. (See *Journal of the Society of Arts*, April 23, 1858, p. 358.)

1849. BAUMGARTNER, in 1849, made observations which proved the existence of earth currents in telegraphic wires. (See Noad's *Manual of Electricity*, p. 239.)

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1849. Mr. W. H. WALENN, in 1849, invented a single-fluid constant galvanic battery composed of cast-iron, acid sulphate of iron, and prepared zinc. The zinc plate is coated with lead (from a solution of the acetate), and then amalgamated; or it may be immersed in a solution containing lead and mercury. (See *British Association Report* for the meeting in 1849, pp. 45, 46.)

1850. Messrs. BRETT, in January 1850, "projected and obtained "concessions" for an electric telegraph line across the Channel. (See Whitehouse's pamphlet *The Atlantic Telegraph*, p. 4.)

1850. M. FROMENT's electric telegraph was invented in 1850. This apparatus writes or marks the dispatch in conventional signs, by means of a style which cuts as it writes, because it turns round itself in the same time that it makes its to-and-fro movement. The style is moved in a direct manner by the armature of the electro-magnet, and can make from 3000 to 4000 vibrations per minute (See Abbé Moigno's *Traité de Télégraphie Électrique*, p. 104.)

1850. Professor PAGE of America, in 1850, described his electro-magnetic engine in a series of lectures which he delivered before the Smithsonian Institution. This arrangement consisted of electro-dynamic helices, which, by their alternate excitement, gave reciprocating motion to iron cores; a connecting rod and crank communicated this motion to a fly-wheel shaft, and thence to the work to be performed. (See Dodd's *Industrial Applications of Electricity*, p. 10; also De la Rive's *Treatise on Electricity*, Vol. III., pp. 339, 340.)

1851. RUHMKORFF, in 1851, constructed his electro-dynamic coil. GROVE and GASSIOT subsequently made researches upon the passage of the electric spark developed by this apparatus in connection with Fizeau's condenser, and made to traverse various media. POGGENDORFF and FOUCAULT constructed improved instruments of this kind. (See Noad's *Manual of Electricity*, pp. 726–730; also De la Rive's *Treatise on Electricity*, Vol. II., pp. 23, 24, and Vol. III., pp. 722–729; also Poggendorff's *Annalen*, t. xciv., p. 289; also *Annales de Chimie et de Physique*, t. xliv., p. 375; also *Comptes Rendus de l'Académie des*

A.D. *Sciences*, t. xlii., p. 215; also *Arch. des Sc. Phys. et Nat.*, t. xxxi. of the 4th series, p. 243; also *Comptes Rendus de l'Académie des Sciences*, t. xliii., p. 44.)

Messrs. G. P. and R. F. BOND of the Cambridge, U.S.,
1851. Observatory, in 1851, read an account of their apparatus for making astronomical observations by means of electro-magnetism to the British Association at Ipswich. This apparatus consists of an electric break-circuit clock, a galvanic battery, and a spring governor, by which uniform motion is given to the paper. The cylinder revolves once per minute, and the observer depresses a break-circuit key at the instant of the transit of a star over the wire or hair line of the telescope, thus making a record accordingly on the paper. This apparatus enables observations to be increased in number, and reduces the personal equation to the minimum. (See *British Association Report* for the meeting in 1851, pp. 21, 22.)

1851. Messrs. BRETT, on September 25, 1851, laid an electric telegraph cable of massive construction across the Channel. (See Whitehouse's pamphlet *The Atlantic Telegraph*, p. 4.)

1852. Mr. LATIMER CLARK, in April 1852. noticed the phenomenon of the slow transmission of electric currents through submerged wires. (See *Journal of the Society of Arts*, April 23, 1858, p. 356.)

1853. M. BOULU, from the year 1853, endeavoured to reduce tumours by causing electric excitation to penetrate into the substance itself of the tumours. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 683, 684.)

Dr. FARADAY communicated the results of his enquiries, respecting the Leyden jar charge of buried electric conducting wires, to the members of the Royal Institution, on
1854. January 20, 1854; he then showed that the electric currents which he employed travelled at the rate of only 750 miles per second along buried wires. (See Whitehouse's pamphlet *The Atlantic Telegraph*, p. 5.)

1854. Mr. WHITEHOUSE, in 1854, commenced his researches on the possibility of working an Atlantic electric telegraph. (See Whitehouse's pamphlet *The Atlantic Telegraph*, p. 6.)

1854. Mr. RUTTER, in 1854, invented a very delicate electroscope, that rendered the development of human electricity

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visible to the senses. (See *Encyclopædia Britannica*, 8th edition, art. Electricity, p. 572.)

1854. Dr. Boekel, of Strasburg, in 1854, made regular ozonometric observations in that city, and is thereby led to suppose that a connection exists between the presence of cholera and the diminution of the quantity of ozone in the atmosphere. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 700, 701.)

1855. Dr. Middeldorpff, of Breslau, in 1855, published a work on galvanism as a caustic. He uses three instruments, the "galvanic cautery," the "galvanic porte-ligature," and "galvanic setons." The galvanic cautery consists of a wooden handle, through which wires from the battery pass; the portion of the platinum rendered incandescent is rounded, and it can be turned to useful account when cold. "The galvanic porte-ligature consists of wires "that are made to pass either in tubes of glass or of metal "and good conducting tubes, but insulated from each "other; the cutting handle is made to project beyond the "extremity of the tube; the wires that pass through the "tubes enable us to give to the terminal handle the volume "and extent that are desired." Galvanic setons consist of platinum wires that are guided through tissues when the object in view is to develope an inflammatory work. (See De la Rive's *Treatise on Electricity*, Vol. III., pp. 687–690.)

1855. Dr. Duchenne, of Boulogne, in 1855, pointed out the different degrees of the susceptibility of the various muscles under the same electric current; also methods of local electrization, by which either the skin or the subcutaneous tissues can be electrized. (See Dr. Duchenne's work *On Localized Electrization and its Application to Physiology, to Pathology, and to Therapeutics*, Paris, 1855; also De la Rive's *Treatise on Electricity*, Vol. III., pp. 618, 633 and 703.)

1855. M. Dubois Reymond, in 1855, gave some lectures on electro-physiology at the Royal Institution, in which the existence of the electric current developed by the action of the human muscles was proved. (See Noad's *Manual of Electricity*, p. 463.)

A.D. 1855. Mr. WHITEHOUSE, in 1855, showed the effect of oppositely charging a submarine electric telegraphic conductor in neutralizing the Leyden jar charge. (See *British Association Report* for the meeting in 1855; also *Practical Mechanics' Journal*, November 1855, p. 185; also Whitehouse's pamphlet *The Atlantic Telegraph*, p. 7.)

1856. Dr. ANDREWS, in 1856, proved that ozone is an allotropic modification of oxygen. Ozone has the following remarkable properties:—1. It negatively polarizes metals that have only a weak affinity for oxygen. 2. It is a powerful oxydizing agent. 3. It bleaches vegetable colors. 4. It liberates iodine from a mixture of iodide of potassium and starch paste. (See *Philosophical Transactions*, 1857, pp. 1–13; also De la Rive's *Treatise on Electricity*, Vol. II., pp. 469, 480.)

1856. Professor MATTEUCCI, in 1856, made note-worthy electro-physiological researches, the results of which were as follows:—"Living muscular tissue developes heat by the "sole act of its contraction." "The electro-motive power "of a cut muscle is independent of the size of its trans-"verse section." "The electro-motive force of the muscle "increases with its length." Mammifers have the greatest electro-motive force of muscles; fish and amphibia have the longest duration of this force after death. Any cause that influences muscles also influences their electromotive force. An instantaneous electrical discharge takes place in a muscle during contraction. (See *Philosophical Transactions*, 1857, pp. 129–143.)

1856. Mr. WHITEHOUSE, in 1856, described an electro-magnetic balance which gave the "value" of an electric current, telegraphically speaking; he also proved that the "law of "the squares" is not the law applicable to the transmission of signals in submarine circuits, but that it is "very little "beyond the simple arithmetical ratio." (See *Athenæum*, August 30, 1856, p. 1092; also *British Association Report* for the meeting in 1856.)

1857. Dr. ZIEMSSEN, in 1857, states that the electric conductability of the tissues of the human body is in direct proportion to the quantity of water they contain, also that the central organs of the nervous system, as well as nerve-

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branches in the large natural cavities of the body, escape the electric current on account of their envelopment in good conductors. With a powerful current, however, these organs may be reached. Dr. Ziemssen also states that electricity is of use in intestinal atony. In his work drawings are given of the position of the points by which to electrically affect the muscles through the agency of the nerves. (See Dr. Ziemssen's *Die Electricität in der Medicin*, Berlin, 1857; also *The British and Foreign Medico-Chirurgical Review*, January 1859, p. 91, *et seq.*)

1858. The ATLANTIC TELEGRAPH COMPANY, on August 5, 1858, received the first signals through 2050 miles of the great Atlantic electric telegraph cable. This is the day on which the cable was first landed at Valentia. (See *Saturday Review*, August 21, 1858, p. 191.)

ELECTRICITY AND MAGNETISM:

THEIR

GENERATION AND APPLICATIONS.

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A.D. 1766, June 10.—N° 850.

KNIGHT, Gowin [Gowan ?].—" Constructing compasses," " so as to prevent them being affected by the motion of the ship," &c.

"The card and box" "are made to oscillate in equal times," "by placing the centre of gravity both of the box and of the card" at proper distances "from their points of suspension," and by fixing an adjustable weight to act as a "pendulum" "to the rim " of the outward gimbol, under the axis, by which the outward " gimbol may be made to move in the same time as the inward. " The inward axis or gimbol is fixed to the bottom of the box." The agate receives the point on which the needle moves, that point being attached to the needle by means of a metal "cross piece" having "small gimbols." "The agate is fixed to a slender stem of " metal, the lower end of which is pointed," and turns freely in " a hollow sockett." "The sockett is fixt as a pedestal in the " centre of the bottom of the box, and has a slit on one side," to admit a pendulum screwed to the lower part of the stem. When " the box is in motion," the pendulum, "stem, and agate will move " to and fro."

Also, "constructing the variation compass," "for taking the sun's " azimuth and amplitude, and the bearing of distant objects." A moveable "mirroir is placed at each end of the index, just behind " the sights," "so as to reflect" "the graduated rim of the card, " which will then appear to the eye" vertical, and cut by the " thread of the opposite sight," which also cuts the object. "In " taking the sun's azimuth," when its height is considerable, "the " rays of the sun are reflected from a small polished cylander placed " behind the sights and an opening is made in each end of the

" index bar, that the brass rim may be reflected without interruption " from the bar, which is slit that the shadow of a thread underneath " it may cut the graduated rim of the card."

[Printed, 3d. See Rolls Chapel Reports, 6th Report, p. 159.]

A.D. 1779, June 25.—N° 1229.

WRIGHT, GABRIEL.—"A new-constructed azimuth and amplitude " compass."

"The new-invented parts" and "improvements" consist of:—

"A horizontal nonius (or verniers) division," "having a vertical " motion" by means of a nut outside the compass box.

An "index and sights, which goes on the compass box," used when the sun's azimuth or amplitude is taken. Two "mirrours" are "placed at right angles to each other on the plane of the index;" also "a screen or dy'd glass," and "a convex glass." "To the " vertical sight" "is fixed a horizontal one," "to look down on " the reflecting glasses &c. to view the sun & the horizon of the " sea and to read of the degrees from the card &c. thro' the " convex glass." "At the other end of the index" is placed a weight "to ballance the whole."

Also an improved "reflecting quadrant or octant, having the " following new parts":—

"A round plate" (with "a hole," "a circular slit," and "a " milled edge"), "carrying the index glass," and moving round the centre of the index, adjusted by a "clamp & screw;" "a " horizontal screw" adjusts the index glass to the horizontal glass. The index glass has a horizontal fine hair line.

A piece of brass is screwed to the quadrant frame, having "a fine " division cut on it" and adjusted "to coinside with a like division " cut on the edge of the round plate."

A "sight vane," "having a piece of thin brass with a hole in " the center," sliding up and down in a "slit," "so as to view objects " in the true plane of the quadrant."

"A brass frame," carrying a hair line, which sometimes takes the place of the sight vane.

A "sight vane," with two lines drawn across the inside (" used " with the compass in taking the sun's azimuth and altitude at the " same time"), is "fastened to the arch of the quadrant."

"A reflecting glass," to view objects from 140 to 180 degrees apart.

"A cylindric box with two parallel glass sides," filled with a liquid that will float a hair (attached to a cork and weight) vertically, "to level the compass by when the horizon of the sea cannot be "observed."

[Printed, 6d. See Rolls Chapel Reports, 6th Report, p. 164.]

A.D. 1782, February 5.—N° 1318.

NAIRNE, EDWARD.—This invention is stated in the title to be, a "New-invented and most usefull improvement in the common "electrical machine (which I call the insulated medical electrical "machine), by insulating the whole in a particular manner, and "constructing the conductors so that either shocks or sparks may "be received from them." The "form to be excited" of this electrical machine is "supported immediately on non-conducting "substances." "The conductor or conductors which either give "to or receive the electrical fire from the excited part, is composed "of a coated electrical jar or jars or any other substance than" [that?] "can receive a charge of electricity or a conducting sub-"stance connected with them." Connected with these "con-"ductors" are "tubes" or "rods," with ball and socket joint or joints, that will conduct electricity, to direct the electric discharge to any part of the body required; and by these means shocks are given by discharging the electricity (either by metallic connection with the earth, or with the conductor of the opposite kind of electricity) when at some distance from the part through which the shock is to be sent; if sparks are required the distance is lessened.

By means of the "conductors" and jointed "tubes," the human body can be in any part affected with either kind of electricity in any convenient manner.

[Printed, 3d. See Repertory of Arts, vol. 7, p. 380.]

A.D. 1782, March 20.—N° 1322.

HERIOT, JAMES.—A "New invented mariners compass, with "compass boxes or bittacles, pendent or standing, with ventilator, "to contain either lamp or candle, as occasion may require, calcu-"lated to obviate every difficulty which those of late use have "been subject to, for the purpose of navigating all kinds of ships "or vessels."

[No Specification enrolled.]

A.D. 1788, August 12.—N° 1663.

McCULLOCH, Kenneth.—"A mariner's compass on a new "construction."

An "azimuth compass" is described and shown, in which gimbals are dispensed with. The "compass vessell" is supported on a pivot at its centre of gravity, which is brought as near as possible to that of the needle; the needle moves upon a point "a small distance above the centre of gravity," and near to the centre of motion on which the compass vessel is free to move. For this purpose the bottom of the compass vessel "rises in a "conical form," is supported upon a "prop" free to turn in the outer case of the instrument, and has "a ring of lead" round its bottom "to ballance" it; two arms, with slits, in which "pivets" are free to traverse up and down, spring from the prop and turn with it when necessary; the pivots are fixed to the compass vessel "in a line with the thin metal plate on which the pivot of the "needle rests." The needle is "bent so that the point of the "pivot" "is a small distance above the centre of gravity." Besides the above, the compass is fitted with an azimuth circle round the edge of the card, a nonius stop with a slide passing through one of the pivots, a metal bar carrying a magnifying glass to read the divisions of the azimuth circle, and "sight vaines."

A "steering compass" on the same principle as the azimuth compass, is described and shown, having the arms with slits, and the prop screwed into the outer case.

Another compass is described and shown. The compass vessel is supported by "jambols," and the inverted cone in which the needle pivot rests has a weight attached to it mounted in small "jambols." The smaller gimbals are supported by standards rising from the bottom of the compass vessel. In this compass all the centres of motion are as nearly as possible in "the same "horizontal plain."

[Printed, 6d. See Rolls Chapel Reports, 6th Report, p. 144.]

A.D. 1791, July 5.—N° 1815.

WRIGHT, Gabriel.—A new method of making mariners' compasses.

A "gimbel compass" is described and shown, in which the "inside compass box or kettle," made of wood or any metal except

iron, has "a ring of lead" fastened "on the outside & near the "centre of motion," "to balance" it. "A metal pedestal" is fixed on the centre of the bottom of the compass box, to which various "pillars or points" "are screw'd on & off at pleasure, "being all at different times made use of to carry or suspend the "magnetic needle & cards." A "hollow metal cone," with a point at the top to receive the needle, is generally placed on the pillar or point screwed into the pedestal; the needle may, however, be placed on the pillar without the hollow cone. Three different "pillars or centres" are described and shown; one with a point to receive the needle; another "with a round top" to receive the hollow cone; and a third with an "agat cap" and gimbals. The needle may either be mounted with a reversible "agat cap," which is kept in its place in a "cylindric brass box" by a helical spring, or it may have an adjustable inverted steel point mounted with a helical spring in a brass box; this last is used with the "gimbel "centre."

The above compass, cards, and needle are used in the azimuth, amplitude, steering, and hanging compasses; also in "the conical "compass with the new invented semicircle to prevent its turning "round horizontally on its centre or prop."

The azimuth compass has the following observable points:—On its card are drawn "a number of lines" "parallel to those usually "drawn through the centre," "quite across from the divisions on "one side to those opposite." A metal circle, semicircle, or quadrant, having a jointed index moving from the centre, with a vernier; this "may either be made fast to the brass ring or cover of the "compass, or made use of detached, having a handle to fasten to "it for the last-mentioned purpose." "One or two sight vanes." "On the plane of the circle semicircle or quadrant is placed one "or two metal frames which contain reflecting plain mirrors" "to shew the horizon of the line by which means the compass is "kept in a horizontal position by the marine horizon."

[Printed, 6d.]

A.D. 1792, June 19.—N° 1891.

FULLARTON, William.—"Certain new methods of separating "iron from iron stones and other ores of that metal, of smelting "it into the state of pig or cast iron, and of reducing or refining "it into the state of mallable or forged iron."

The ores are first to be "reduced into a pulverized state," "previously calcining the material when necessary," "and passing "the same through sieves or bolters." Then the extraneous matters are separated "by all or any of the following operations, "(namely,) by washing, levigating, triturating, wennowing, *and* "*by the application of magnetic attraction*, according to the nature "and qualities of the different stones and ores." The materials thus purified are to be put into a furnace.

A furnace "to act as a crucible" is described, also the method of using it in this invention, for which it is used in preference to any other kind of furnace.

[Printed, 3*d*. See Repertory of Arts, vol. 1, p. 297.]

A.D. 1794, March 18.—N° 1980.

NUGENT, PATRICK ROONEY.—"Two instruments whereby the "latitude, longitude, and magnetic variation at sea or on shore "may be obtained."

"An universal reflecting septant, sextant, oxtant, or quadrant," "a glass tubb and bubble," and "a pendulum for taking altitudes "without an horizon," are described, and their use elucidated.

"A steering or universal azimuth compass" is described, with "an aperture of 45° horizontal width" "cut out of the side of the "kettle," half on each side of its shoulders or axis. "Immediately "above them" are "two plain sights," firmly fixed so that their central hairs are "exactly opposite to the north and south points "of the card or needle." The apertures "are to be glazed with "glass or ising-glass."

A method of finding the magnetic variation by this compass is given.

[Printed, 7*d*. See Rolls Chapel Reports, 6th Report, p. 188.]

A.D. 1796, January 19.—N° 2081.

WRIGHT, GABRIEL.—An azimuth and amplitude compass is described and shown, in which the following additions are made, "by which any one person, without assistance, is enabled to take "the azimuth of all celestial objects and their altitudes at the "same time and in every latitude or altitude of the object."

A "reflecting octant" fastened on to the top rim of the compass, "in a vertical position," by screws.

A "reflecting speculum," and adjustable convex lens, mounted in a sliding tube, used to reflect and magnify the divisions on the card and nonius "in a horizontal view, to be read off by "the observer at the time of observation without any personal "assistance."

A "jointed sight vane with a silk line" to "observe by the "sun's shaddow;" also a sight vane with dark glass for taking the azimuth.

A method of stopping the compass card by the action of two parallel "bent levers or bridles," one end of which "screws on to "the nonius piece," and the other on to an open stop piece on the opposite side of the card; thus, by pressing a nut connected with the nonius piece, the levers cause the card to be pressed in two opposite directions, and stop it without error.

An "artificial horizon" to be used with the octant, a "dial "and index" "to shew the ship's run during the interval of time "in making two observations of the sun's azimuth and altitude," a "screw" with an "index" and "scale" used with the dial, and a scale and quadrant made use of for solving nautical problems, are also described and shown.

[Printed, 8d.]

A.D. 1798, March 10.—N° 2221.

PERKINS, Benjamin Douglas.—The title of this invention is as follows:—"Discovery of a certain art of relieving and curing a "variety of aches, pains, and diseases in the human body, by "drawing over the parts affected, or those contiguous thereto, in "certain directions, various pointed metals, which, from the "affinity they have with the offending matter, or from some other "cause, extract or draw out the same, and thus cure the patient."

The invention consists in employing those metals "which pro-"duce that action on the nerves and muscles of animals, known "by the term galvanism." "Combinations of copper, zink, and "a small proportion of gold, and also iron united to a very small "proportion of silver or platina," are found most efficacious. Instruments are made with points, which are applied "to those parts "of the body which are affected with disease" and drawn "off on "the skin to a considerable distance from the complaint, and "usually towards the extremities." "The diseases most readily "cured by this metallic influence are rheumatism, gout, pleurisy,

" inflamation, spasmodic affections, and most kinds of topical " complaints. All parts of the body on which the metals are to " be used, as well as the metals themselves, should be perfectly free " from oily and greasy applications. The relief from this metallic " application" takes place in from 15 minutes to "several weeks," according to the nature of the disease.

[Printed, 3*d*. See Repertory of Arts. vol. 2 (*second series*), p. 179; and Rolls Chapel Reports, 6th Report, p. 147.]

A.D. 1798, June 27.—N° 2246.

NUGENT, PATRICK ROONEY.—"New invented and improved " mathematical instruments, whereby the latitude and longitude, " variation and inclination of the magnetic needle at sea and on " shore may be obtained in a more general, masterly, and perfect " manner than hath hitherto been done."

[No Specification enrolled.]

A.D. 1798, December 17.—N° 2280.

PECKHAM, JOHN RANDALL.—"A new and improved method " of constructing a watch so as to unite it with a mariner's com-" pass, in such a manner as to answer every purpose with equal " accuracy and perfection for which either of them might be sepa-" rately used."

"My method of constructing a watch so as to admit the uniting " it with a mariner's compass, in such manner that the works of " the watch shall not affect the magnetic needle nor be affected " by it, is this:—I substitute for those works which are usually " made of steel, and which are near enough to affect in the smallest " degree the free action of the magnetic needle, works made of " gold, silver, or any other metal or admixture of metals which " have no influence on the magnetic needle, (that is to say) in all " cases (whether the mariner's compass be inserted in or upon the " face of the dial in any part, or in any part of the back of the " watch, either in the box or case), for the following parts usually " made of steel (viz[t].), the barrel, arbor, cannon pinions, ratchets, " and clicks, bolt, bolt spring, detant work, stopworks, cap, spring, " and screws, and for every article or part where steel is not " absolutely required, I substitute gold, silver, or some other metals " or admixture of metals, as above-mentioned."

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 147.]

A.D. 1805, October 7.—N° 2883.

STEDS, John.—"An improved steering amplitude or azimuth "compass."

A compass is described and shown, in which "the outside "gimboal" is taken away, and the kettle is suspended on pivots in the "betical" [binnacle?], with or without a wood box; the pivots on which the kettle is suspended prevent the pitching of the ship from affecting the needle. To prevent the needle from being affected by the rolling of the vessel, "a half gimbol," to which the needle centre is fixed, is suspended inside the kettle on pivots at right angles to those suspending the kettle, thus giving four suspending points to prevent the card from being disturbed by the motion of the ship. In this compass the "lubbard's point" [lubber's line?] is marked on the half gimbal, and is therefore not obscured by a side light when the ship is rolling.

The amplitude compass is the same as the steering compass, except that it has pins to receive sight vanes, and a deeper cover.

An azimuth compass is also described, in which there is "a spring "to the nonius and a trigger" to which is fixed a thread for the observer to stop the compass card by; there is a Drawing evidently showing this, but not referred to in the Specification. To keep the azimuth compass from wear, when not in use, there is "a notch in "the standards to place the suspending pivot into when wanted "for use, and to take it therefrom and place the compass in the "bottom of the box when not wanted to be used."

A "scale," to work various nautical problems connected with the ship's course, is also described and shown in detail.

[Printed, 1s. 1d.]

A.D. 1809, September 26.—N° 3265.

SMITH, Egerton, and HARRIS, Michael.—"Certain im- "provements in ships' binacles and compasses, and in the mode "of lighting the same." This invention, called "The patent tell- "tale binacle and compass," consists in the following improve- ments:—

1st. The compass is visible on deck and in the cabin "at the "same time."

2nd. The compass is illuminated by the same light which lights the cabin.

3rd. Preventing the compass card from being unshipped.

4th. "In enabling the mariner to steer with one compass only" and a small binnacle.

5th. In "darkening the binacle," so "that whilst the compass is "distinctly visible," "no light shews" "to an enemy."

These improvements are effected as follows:—The compass bowl is open at the top and bottom. The compass card is of "paper, parch-"ment, silk, cloth, with or without talk" [talc?], "glass, or other "proper substance, printed on both sides;" or "a card of metal, "with either the points or the interstices cut out, and the spaces "filled up with paper, printed or plain, pasted over its whole sur-"face," may be used. "Two card faces" may be pasted together, "with their faces outwards," or an impression may be taken from the engraving, having a sheet of transfer paper on the side of the card not printed on by the block. To load the card, it is stretched upon two metal rims, rivetted, one on the upper, the other on the under surface. The card centre is supported either on a bar fixed across the bottom of the compass bowl, or fixed into a hole in the lower glass by a screw and nut. Another bar, with a wire projecting into the hollow top of the needle cap, is fixed across the top of the compass bowl, which prevents the card being unshipped. The light is admitted from the cabin by openings in the deck, binnacle, and compass box. A "slide" is placed in the binnacle, "just "above the compass box," to exclude unnecessary light. The invention is applied to compasses of the usual construction, by reflecting the light from below to the face of the compass by a mirror.

[Printed, 3*d*. See Rolls Chapel Reports, 7th Report, p. 206.]

A.D. 1810, July 18.—N° 3363.

STEBBING, George.—"Certain improvements on the action "and other parts of sea and land compasses," consisting of:—

1st. For the "metal or steel" "center or point" that supports the card is substituted "a ruby, jewell, precious or any other hard "stone or composition" set in metal, and long enough to bring the card near the centre of gravity.

2nd. For the "tap" or "bottom of the cap," "hard metal" or stone is substituted for agate. "In the center thereof is sunk the "section of a small circle or sphere, well polished, to receive the

" head of the ruby " that supports the card, " instead of the socket " in the agate, as before used."

3rd. The ends of the magnetic needle are made square, "by " reducing the width of the needle to its thickness."

4th. "In time of action or very bad weather," the card and needle are suspended by a silk thread, "about one quarter of an " inch off the center, hung from the glass by means of a swivel or " hook" "to the top of the cap or from a piece of metal put " across the kettle or bowl;" "and at the bottom of the cap, under " the card," "a piece of tube about an inch long, in a conical " shape," is placed, so that the card will neither touch the side of the kettle nor be thrown off the centre. Or the compass may be suspended "with elastic springs."

[Printed, 3*d*. See Rolls Chapel Reports, 7th Report, p. 266.]

A.D. 1810, August 14.—N° 3371.

WHITMORE, William.—"The magnet toy, to facilitate the " teaching of children to spell, read, and cypher in any tongue, " with ease to the teacher, pleasure to the learner, and proportionate " expedition."

This toy consists of a box (containing mechanism) having depicted on its upper surface "either the letters of the alphabet, " numerals, types, symbols, or musical notes, according to the " views of the teacher," arranged in a semi-circular form somewhat like the plate of a dial; an "index," revolving about the centre of the dial, carries a horse "or other captivating, whimsical, or attrac-" tive device;" at the pleasure of the teacher the horse is made to take up any loose duplicate letter or sign laying on "another con-" centric, &c. exterior, semicircular, inclined rim," opposite to those on the dial, and to deposit it on a flat semi-circular rim which occupies the remaining half circle to that from which the duplicates are taken; the horse also nods, shakes his head sideways, and has other motions at the will of the operator.

The *horse's head* is balanced by a weight concealed within the body and acted on by a string from the front of the box, passing through the hollow index centre and the leg, so that on its being pulled, the horse's head is depressed, and a magnet placed in his mouth is brought into contact with a piece of iron on the duplicate; on releasing the string the concealed balance weight raises

the horse's head; another string, having its two ends projecting from the front of the box, passes round a pulley on the index axis and turns the horse round; the head is then depressed, the duplicate strikes against an upright ridge, and is deposited on the rim.

Another method of moving the horse is described and shown, in which a handle connected with a shaft and pinion moves a crown wheel on the index axis; levers, rods, and tubes give motion to the horse's head.

[Printed, 7*d*. See Rolls Chapel Reports, 7th Report, p. 206.]

A.D. 1812, January 23.—N° 3525.

ROWLAND, RICHARD.—"Certain improvements in ships' steer-" ing wheels, compasses, and binnacles, and in the mode of " lighting the same."

A binnacle is described and shown having three compartments in the upper part. A compass card is in each of the end compartments, respectively " suspended " on metal centres fixed to the bottom of the compartment. Each compartment has a door and "wings" on hinges, so as to protect the vertical glass over the compass; also a skylight, over one of which a rule and "a pair of " lights" [sights?] is fixed to ascertain the "bearings of any ob-" ject seen." The centre compartment contains the light, which can be drawn up close to the compasses, and is minutely described. Rollers and curtains exclude the light when necessary, and a " time-glass " is fixed " on a center " at each end of the binnacle. " When the glass comes to an upright position the compass card is " about one foot in diameter." The cap of the storm compass " is fixed under the card, so that the center of suspension is in the " plane of the upper surface of the card." "The lubber's line is on " a swinging pendulum " whose fulcrum is "in the plane of the " center of suspension of the card." The lower part of the binnacle has three compartments, the two outside ones are cupboards, and the centre one contains a "dripstone" cemented into a pan without a bottom, thus forming a bottom to it.

When the steering-wheel is mounted fore and aft, instead of athwart ship as heretofore, a square binnacle is used with a " lighthouse " at one corner. The cards are viewed in a similar manner to that of the former binnacle; they are, however, transparent, and placed one underneath the other. The light is lowered

and raised by a cord, and lights the cabin as well, the bottom of the binnacle being glazed.

Various compasses are described with centres fixed in the bottom of the box, with or without "gimbols." The box is filled with spirits of wine.

A method of preserving candles is also described, by dipping the wicks into melted tallow and packing them in a vessel of water, oil, or spirits, or in a water-tight case in a vessel of water.

[Printed, 7*d*. See Rolls Chapel Reports, 8th Report, p. 88.]

A.D. 1813, January 30.—N° 3644.

CROW, Francis.—"Certain improvements in the mariner's "compass or boat compass."

This compass has a "card or index" that floats in alcohol "contained in a metallic bowl, suspended by gimbals." "The "card or index of this compass is constructed of two concave "metallic plates, which are hermetically sealed or soldered together, "forming a lens, within which is contained and firmly fixed a "magnetic needle." A glass plate confines the liquid in the bowl and permits the card to be seen; in the centre of the inside of the glass plate a metallic point is cemented, which projects downwards into "an inverted hollow cone" fixed on to the centre of the upper part of the card; to the centre of the under part of the card a weight is attached, keeping it in an horizontal position and "adjusting its pressure on the point of action." To stop the vibratory motion of the bowl, a "rod" is attached to the centre of its external surface, having "a tender spring, which "is received by a concave metallic dish attached to the compass "box underneath the said bowl, on the surface of which dish the "said spring freely acts." Another method of stopping the vibration of the bowl is described and shown:—"A segment of a "sphere (the radius of which arises from the line of suspention) is "attach to the inferior side of the said bowl, acting against the "extremity of a tender spring arising from the side or other part "of the compass box." A "spring valve" admits the escape of expanded air in a hot climate. The alcohol is replenished by means of a chamber round the upper part of the bowl.

[Printed, 6*d*.]

A.D. 1813, February 4.—N° 3646.

ALEXANDER, George.—"An improved mode of suspending the card of the mariner's compass."

The agate cup, receiving the steel point on which the needle is free to move horizontally, is suspended by gimbals; also the point on which the needle moves is suspended by gimbals. This is accomplished by having a "fork" with "two prongs" stand up "perpendicularly" from "the bottom of the brass (or other "suitable metallic) box;" "a gimble ring" is suspended by screws between the prongs, within which ring the agate cup is similarly suspended. "In the centre of the magnetic bar, on "which the card is placed, there is a large circular opening to "admit through the fork, at the north and south sides of which "are fixed two small upright pieces of brass (or other suitable "metal), holding between them by a screw from each a large "gimble ring, on which gimble ring is erected at the east and "west sides a gallows or arch of brass (or other suitable metal), "in the centre of which, directed downwards, is the point which "rests in the agate (or other substance) cup below. On the top "of the gallows or arch there is placed a thin piece of concave "brass (or other suitable metal) about one inch diameter, and in "the centre of the glass, immediately above is fixed a prong "pointing downwards which acts within the cavity of the brass "(or other suitable metal) below."

[Printed, 3*d*. See Repertory of Arts, vol. 23 (*second series*), p. 330.]

A.D. 1813, November 25.—N° 3760.

DUNCOMBE, John.—The title of this invention refers to all the improvements set forth in the Specification, and is as follows:— "My invention and improvement, as hereafter described and "applied to mathematical and astronomical instruments, in order "to render them more portable, accurate, easy, expeditious, and "certain in their application to topographical and nautical sur-"veying, and the mensuration of celestial angles on land or sea, "and for ascertaining the direct distances of inaccessible objects "within a limited extent at one station only, without the usual or "any other calculation. These inventions and improvements "consist in a new index, which ascertains the measured quantity

"of an angle to any proposed rational degree of precision, by ren-
"dering the divisions of those minute parts hitherto imperceptable
"to the sences truly conspicuous and distinctly legible by the
"common naked eye; and an attached new parallel movement,
"by which the natural sine and cosine of such angle are at the
"same time precisely obtained to any eligible radius, without
"tabular or other reference; and also a detached new parallel
"movement, furnished with telescopic or other sights, by which
"the direct distances of inaccessible objects within a limited extent
"are accurately measured at one station without trigonometrical
"or other calculation; and a new improved compass, whose index
"points due north and south, and which is capable of adjustment
"according to the known or observed variation of the magnetic
"needle."

The "improved compass" has "a brass or other non-magnetic "index fitted to the cap of the magnetic needle, and which is "capable of being always adjusted thereto, according to its known "or observed variation from the meridian, and thereby caused "constantly to point due north and south. This improvement is "general to the compass of every description."

[Printed, 11*d*. See Rolls Chapel Reports, 8th Report, p. 99.]

A.D. 1818, May 7.—N° 4259.

JENNINGS, Henry Constantine.—"An improvement in the "mariners' compass, being a means of guarding or protecting the "magnetic needle of it from all action arising from iron in its "neighbourhood."

The compass is "mounted and fitted up in the usual manner "*with gimbals*, glass cover, wooden case, &c.;" but the needle card carries "four pieces of iron softened by annealing," two being "screwed to the card at each end of the needle," these "are in-"tended to act as guards against the passage of the magnetic "fluid, by absorbing the first quantity of it." Iron filings, carefully annealed, are made to surround the needle by being enclosed "*between the* sides and bottoms of the brass or copper boxes "which enclose the needle and card;" the sides and bottoms of the boxes are kept exactly the same distance apart, truly circular, and flat; and "the needle card, &c.," is "suspended on a point "accurately in the centre of the box." The "guards at the ends "*of the needle*" are of thin sheet iron, bent so as to be concentric

with the card centre when they are fixed, thus forming segments of a circle. The iron for the "guards," as well as the iron filings, are annealed "by being enclosed in a soft plate iron box, and "intimately mixed either with alumine clay, in fine powder," or "an argillaceous iron ore;" the box is then "well covered with a "soft plate iron lid," "exposed to a strong red heat," and let "remain in the oven or furnace until it is become cold," the powder is then separated from it.

The kind of needle "used by the late Dr. Gowen" [Gowan?] "Knight" is preferred.

[Printed, 6*d*. See Rolls Chapel Reports, 8th Report, p. 125.]

A.D. 1819, May 18.—Nº 4374.

ATKINS, GEORGE.—"An instrument for ascertaining the varia-"tion of the compass."

This invention consists of:—1st. "Certain improvements in "magnetic needles." Two steel wires or arms, having north polarity at their free ends, are affixed "to the south half of the needle, "forming equidistant angles of about sixty degrees with the north "end of the needle." Owing to the magnetic force to which the needle is subject being greatest when the needle is 90° from the meridian, it is believed that this needle will have greater magnetic force and steadiness than a needle of the usual construction.

Another improvement in magnetic needles consists in making the needle, in vertical section, of the form of a "segment of a "circle, or of an elipse, or of a polygonal figure, having a ring "or aperture at bottom to admit the central point, and two "horizontal ears at the ends, to which the card is attached." In this needle the magnetic fluid is in a vertical line near the extremities.

2nd. An instrument for ascertaining the variation of the compass. A collar (suspended at its centre on a pillar by gimbals) carries a dial, engraved as a compass card, and able to be set to any required point, either by a compass mounted on the cap of the collar, by the binnacle compass, or by one in another compartment of the same box. The collar has a limb, with a long and short sight moveable on it and on the dial, and a weighted hollow cone to balance the instrument.

In another construction, the collar is balanced on a pivot, and carries an arm with "a vertical crotch," "having a slit or notch

"which slides freely (but without any shake) on a steel fixed to "the side of the box."

In a third arrangement, the central collar is suspended by external gimbals affixed to the box. A balance weight is attached.

Also, a cheaper form is described, in which a wooden dial plate is suspended to the box by gimbals, and one removeable sight is used.

[Printed, 7*d*. See Repertory of Arts, vol. 86 (*second series*), p. 1; and Rolls Chapel Reports, 8th Report, p. 188.]

A.D. 1824, August 5.—N° 4996.

GRAYDON, George.—The title of this invention is:—"A new "compass for navigation, and other purposes;" but it relates to a "celestial compass," which is "adapted to obtain data for "determining the latitude or longitude at sea by means of the "heavenly bodies, and at a time when the horizon is obscured, "and also of finding the azimuth of the sun or a star at any time "when these objects are visible."

This compass may also be used "in place of the ordinary mag-"netic compass," and for "ascertaining the variation of the "magnetic needle." No magnetic needle is used in this compass; in obtaining "the moon's meridian, distance, and declina-"tion, as data for determining the latitude or longitude," however, it is directed to turn the instrument round upon a vertical axis until certain horizontal axes, and consequently a certain line, "is found, by the aid of the common magnetic needle or "any other convenient manner, to be somewhere near the plane "of the meridian." Modifications of this instrument, and methods of adjusting it, for use "by day when the sun is visible," "for steering a ship by means of the motions of the heavenly "bodies, instead of steering by the magnetic needle," and for "taking bearings on land, or for laying down angles in surveying "by means of the heavenly bodies, without using a magnetic "needle," are described at length.

[Printed, 8*d*. See London Journal (*Newton's*), vol. 12, p. 126.]

A.D. 1825, June 18.—N° 5189.

PHILLIPS, Charles.—"A certain improvement or improve-"ments in the construction of a ship's compass."

In order to provide against "the firing of cannon or any other

" circumstances " that " produce violent concussions, such as the " sudden jerks produced by the paddles of a steam-boat, &c." the compass box is mounted on a pivot (the upper end of which is the pivot of the needle), which rests upon a helical spring enclosed in the standard rising from the centre of the bottom of the wooden case. The reacting force of the helical spring is adjustable by means of handles connected with the bearing on which it rests by slits in the tubular standard, the bearing for that purpose resting in suitable notches in the standard.

To adjust the centre of gravity of the compass to suit all weathers, a leaden ring is made to move up and down the compass box by palls falling into notched racks fixed vertically on opposite sides of the compass-box. " Whenever it blows hard the leaden " ring must be raised to such a height as to reduce the motion to " that degree which shall be most convenient;" " in fine weather, " on the contrary," the leaden ring must be placed " as low as it " will allow."

The " lubber's point " is placed on the upper arm of a pendulum whose centre of suspension is moveable in vertical guides, so as to enable the lubber's point to be adjusted " even with the upper edge " of the compass." The pendulum bob is also adjustable so as to make " the motions of the lubber's point correspond with those of " the compass."

[Printed, 6*d*. See Repertory of Arts, vol. 2 (*third series*), p. 295; London Journal (*Newton's*), vol. 11, p. 181; Register of Arts and Sciences, vol. 3, p. 344; and Engineers' and Mechanics' Encyclopædia, vol. 1, p. 369.]

A.D. 1832, May 30.—N° 6269.

PRESTON, GRANT.—" An improvement or improvements on " ships' compasses."

This invention " consists of improvements or additions to the " common compass to prevent the vibration to which the compass " is now subject, and which at present tends to prevent the correct " action of the needle." The pin on which the compass card is suspended passes up through a tube or ring attached either to the agate cap or to the card, " and when the card has a tendency to " vibrate, in consequence of any motion to the vessel, the lower " end of the tube will come in contact with the pin and stop such " vibration. At the same time there will be sufficient play to " ensure the action of the needle, and thus will compasses with

"my improvements applied be more correct in their action." The tube or ring may be either screwed into the agate cap, or attached to the card by means of arms riveted to the needle.

This improvement is applied to the dipping needle by the following means:—The needle, "in place of being affixed to the "card," "is suspended on two axes," one on each side of the agate cap, there being an aperture in the centre of the needle to permit the agate cap to pass. The bearings of the needle axes are on the card, which is connected with the agate cap by means of a tube supported by arms from the card, as in the application of the improvements to the ordinary compass. The needle is *thus* "permitted to swing up and down, as is usual with this description "of compass," and any vibration of the card is checked by the lower part of the tube coming in contact with the pin sustaining the card.

[Printed, 6d. See Repertory of Arts, vol. 14 (*third series*), p. 197; London Journal (*Newton's*), vol. 1 (*conjoined series*), p. 357; and Register of Arts and Sciences, vol. 7 (*new series*), p. 291.]

A.D. 1834, March 1.—N° 6570.

PINKUS, Henry.—The title of this invention is:—"An improved "method of or apparatus for communicating and transmitting or "extending motive power, by means whereof carriages or waggons "may be propelled on railways or common roads and vessels may "be propelled on canals." This invention relates to a pneumatic "railway," in which magnetic attraction may be employed, and which may either form "a complete system of railway in itself," or be applied to common railways or canals.

"An extended tunnel, tube, pipe, or conduit" is laid down, which contains a piston. On one side of the piston the air is exhausted from the tube by suitable stationary engines and pumps at suitable distances along the line. To the piston is attached "a "vehicle or machine" called "the dynamic traveller," which is in connection with "a car" on the outside of the tube called "the "governor," to which the carriages, &c. to be propelled are attached. In the "pneumatic railway" itself, the rails are cast on the *sides of the* tubes; but in its application to existing railways or canals, the tube is laid down between the rails, or at the margin of the canal.

The connection of the "dynamic traveller" with the "governor" is proposed to be made either by means of a longitudinal "pneumatic

"valve," through which a vertical arm rises, or by magnetic attraction. To apply magnetic attraction effectively, "the dynamic "traveller" carries a frame of "horse-shoe magnets" "set "transversely," with their poles placed as near to the under surface of the tube as possible. "A similar combination of similar "magnets inverted," is attached or suspended "under the body "of the governor," and in order to enable the space between the poles of the magnets in the two frames to be as small as possible, the upper part of the tube has a copper plate fitted air-tight into the opening instead of the valve. In the "dynamic traveller" soft iron may be used instead of the magnets. Electro-magnets may be used.

Details are set forth of the manner of mounting the "dynamic "traveller" and "governor," and respecting the "pneumatic "valve," valves interposed at the extremities of a given length of tube called "station valves," and other matters.

[Printed, 1s. 9d. See London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 158; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 36; and Rolls Chapel Reports, 7th Report, p. 150.]

A.D. 1834, March 13.—N° 6574.

HAWKINS, JOHN ISAAC (*a communication from Daniel Harrington*).—"Certain improved instruments for facilitating the cure "of disease by administering galvanic influence into the human "body."

"Various instruments" "compounded of" "any two differently "oxidable metals" "by which galvanic influence is excited, "the said instruments being respectively so variously constructed "as to convey the mild galvanic influence in a convenient "manner into or near upon the parts of the body on which "it is desirable to operate." The "differently oxidable metals" (silver and zinc are instanced) being placed or pressed in contact with the body and with each other are enabled to generate electric currents by means of the natural fluids of the body. When required these instruments are made to hold "warm water whereby the parts "of the body operated upon may be raised in temperature."

The forms of the acting surfaces of the apparatus described in the Specification, and shown in the Drawings, are suited to the part operated upon, and are smooth or indented according as the part of the body to which they are applied is hard or soft; more than one couple of metals are used in certain cases; and provision is

made (when necessary) for the continuity or intermittent character of the electric current, according to the wish of the operator and during the action of walking. The contrivances for "electrizing" the passages of the human body are suited to their sinuosities, and when necessary made flexible. Besides plates, wires of the "differently oxidable metals" are twisted together, made into helices, and woven or platted together, "spangles" "overlapping "one another" are sewn on to silk, and a mixture of the filings of zinc and silver (for instance) are cemented upon cloth, &c.

The invention also comprises an instrument for puncturing the skin by suddenly letting go a steel spring from its detaining catch, which spring contains the "pointed ends of fine sewing needles, "say, from a score to a hundred," and has its action regulated by a perforated plate and adjusting screw, so as to enable the skin to be punctured to the desired depth, and thus render the transmission of the electric current through the cuticle more easy.

[Printed, 1s. 6d. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 195.]

A.D. 1837, April 22.—N° 7350.

ULRICH, JOHN GOTTLIEB.—"Certain improvements in chrono-"meters," consisting of :—

1st. "A mode of ensuring a continued action of the balance of "a chronometer, by means of improved escapements or mechan-"ism, which prevent the liabilility of the works being brought to "rest by any sudden shock or circular motion of the instrument "in the plane of the balance."

2nd. "Modes of compensating for the expansion and contrac-"tion of the balance spring under variations of temperature," which "allow of the employment of such materials for the balance "*as are not subject to magnetic influence*, (viz.,) platina, palliadium" [palladium?] "glass, &c.;" "and also a mode of adjusting the "compensating parts of the pendulum of an astronomical time "keeper."

3rd. "An improved mechanism for stopping the hands of a "watch without interrupting the action."

4th. "A new mode of locking and unlocking the striking parts "of such chronometers as report the time."

5th. "A mechanism for discharging the striking parts of an "alarm or warning watch."

6th. "A mode of preventing the oxidation of the springs of "chronometers, by covering them with a thin coat of some "metal which is not liable to become oxidated." Coating by immersion.

[Printed, 3s. 1d. See London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 121; and Rolls Chapel Reports, 7th Report, p. 126.]

A.D. 1837, April 29.—N° 7355.

CRAUFURD, HENRY WILLIAM (*a communication*).—"An im"provement in coating or covering iron and copper for the pre"vention of oxidation."

A coating of zinc is employed, which may be covered with a second coating of tin, or of tin alloyed with lead. The zinc coating may either be applied by means of fusion, or "as a paint, "which then takes the name of galvanic paint."

The metal to be coated is prepared by "scouring;" it is immersed "in water acidulated with sulphuric acid. The acidulated "water should be heated in a leaden vessel, or it may be used cold "in wooden vessels." The metal is then "thrown into cold water," "scoured with sand and a piece of cork," "rubbed with a brush," and "thrown into clean water." Or the pieces of metal may be dipped in a solution of sal ammoniac, or dilute muriatic acid; they should be dried immediately after this last process, "and coated "with as little delay as possible."

To coat iron or copper with zinc by fusion in an earthenware crucible:—"The zinc being melted it must be skimmed carefully, "and its surface covered with sal ammoniac or any flux;" the prepared pieces of metal are then "introduced into the melted "metal," moved about, drawn out slowly, and before the zinc surface "has become set" "thrown into clean water, and rubbed "therein with a sponge or brush;" they are then dried rapidly in bran or sawdust; "a grated case with two handles" is employed for plates of the ordinary size; small articles are thrown into the melted zinc and sal ammoniac, taken out slowly with an iron skimmer, "put altogether in a reverberatory furnace and covered "with charcoal," then submitted to a red heat, shaken, and cleaned in a similar manner to the larger articles. Wire may be thus coated by being made to pass through the zinc, and cleaned as above.

The "galvanic paint" "is composed of zinc powder well "ground and mixed with the substances generally employed for "painting;" "the oils distilled from coal tar," or coal tar itself with "spirit of turpentine" are preferred.

The second coating with tin, or tin alloyed with lead, is applied to large articles, and to vessels to receive acids or food. The articles are moistened with a solution of sal ammoniac or muriatic acid, dipped rapidly in the fused metal, and drawn out slowly, but not so that the zinc quits them: the fused metal is covered with a layer of fat or tallow.

[In the "scouring" process, although no mention is made of electrical action in the Specification, the immersion of the iron or copper articles in the dilute sulphuric acid, in contact with the leaden vessel, would generate a galvanic current tending to increase the solution of the iron or copper, and to perfect the process. The only way in which the term "galvanic paint" can apply is on the supposition that the iron or copper is partially laid bare, and thus exposed to damp, when the presence of the highly positive metal zinc in contact with the iron or copper would form a galvanic circuit, and prevent the solution or rusting of the iron or copper.]

A "Disclaimer and Memorandum of Alteration" was enrolled June 14, 1839, by John James Siordet, John Charles Louis Meyer, and Robert Louis Siordet, to whom the interest in the patent was assigned by Louis Count Jelski, to whom Henry William Crauford assigned the said interest; in which that portion which relates to "galvanic paint," and the second coating of tin, or tin alloyed with zinc, is disclaimed, and the invention restricted to "the mode of coating copper and iron for the prevention of oxy-"dation by immersing the same in melted zinc." Also, "the "words, 'or any flux,' in the sentence 'The zinc being melted it "'must be skimmed carefully, and its surface covered with sal "'ammoniac or any flux,'" are proposed to be omitted, they having been "inserted with a view to state that any matter acting "in a like manner might be used."

A "Disclaimer" was enrolled September 2, 1848, by the same parties, who enrolled the above "Disclaimer and Memorandum of "Alteration;" in which the "galvanic paint," the "second coating

" of tin or tin alloyed with lead," also the words, " 'or any flux,' " are disclaimed; thus restricting the invention to "the mode of " coating copper and iron for the prevention of oxydation by im" mersing them in melted in zinc, having its surface covered with " sal ammoniac."

[Printed, 5*d*. See Repertory of Arts, vol. 9 (*new series*), p. 289; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 65; vol. 24 (*conjoined series*), p. 457; and vol. 21 (*conjoined series*), p. 478, for disclaimer; Hindmarch on Patents, pp. 293 and 430; and Rolls Chapel Reports, 7th Report, p. 186.]

A.D. 1837, June 6.—N° 7386.

BERRY, Miles (*a communication from Edwin Williams on behalf of Thomas Davenport*).—The title of this invention is:— " A certain improvement, or certain improvements, in obtaining " motive power for propelling or working machinery." This invention relates to rotary motion obtained either by means of " galvanic" magnets alone, or "galvanic" magnets in combination with "permanent" magnets.

This invention consists of a number of electro-magnets fixed radially on a rotating shaft, and segmental permanent magnets ("galvanic magnets" may be used) fixed to the frame supporting the rotating shaft. The motion of the rotating magnets is made to take place, by the approach of their poles to poles of the fixed magnets of opposite names; for this purpose the rotating "gal" vanic" magnets are made to change their polarity at proper times by the motion of plates (in metallic connection with the conducting wires surrounding the "galvanic" magnets) against fixed segmental plates, corresponding in number and position to the number and position of fixed segmental magnets, which segmental plates are connected in a suitable manner with the poles of a galvanic battery.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 13 (*conjoined series*), p. 351; and Rolls Chapel Reports, 7th Report, p. 187.]

A.D. 1837, June 12.—N° 7390.

COOKE, William Fothergill, and WHEATSTONE, Charles.—" Improvements in giving signals and sounding " alarums in distant places by means of electric currents trans" mitted through metallic circuits;" they are as follows:—

A five needle telegraph. The symbols are indicated by the simultaneous deflection of two of the magnetic needles whose coils are included in the circuit, the required letter being found on a dial at the point to which they converge. In this signal apparatus the needles move in vertical planes, they being heavier at the lower ends to enable them to point vertically when not conveying signals; stops limit the angular motion of the needles, and they are astatic, one being within the coil, the other exterior to it on the face of the dial plate. To complete the circuit, a combination of finger keys is used, by which the line circuit is broken at the same time as the voltaic battery and signal apparatus are interposed; and by springs and studs, in connection with the finger keys, the current may be made to circulate in either direction. Five line wires are used in the above telegraph (one to each needle coil), or each needle may be deflected separately by having a sixth line wire for the return current. A four needle telegraph on the same principle, with five line wires, is also described and shown.

Methods of insulating and supporting the line wires are described and shown, consisting of placing them in a resinous cement in channels in the rails of post and rail fences; or in various shaped tubes or troughs, the wires being previously covered with cotton, and varnished.

A method of deflecting telegraph magnetic needles by electro-magnets. The current is made to magnetise two horse-shoe electro-magnets placed opposite to one another with the needle between their poles; similar poles are opposite, and the deflection takes place according to the polarity (*i.e.* the direction of the electric current).

A method of "sounding alarums in distant places." The detent of a clockwork is removed by an electro-magnet, on the completion of the circuit, and is again interposed by a spring on the ceasing of the magnetism; or a hammer is made to strike a bell by similar means.

"Sounding alarums in distant places by the aid of an additional "voltaic battery." A battery, devoted solely to working the alarum, and not belonging to the line circuit, has its local circuit completed by the electric current from the distant battery. For this purpose the line circuit deflects a needle on whose axis a forked wire is mounted, which completes the local circuit by dipping into mercury cups; or the local circuit may be completed by the evolu-

tion of gas (caused by the line circuit), forcing mercury in a U tube into contact with a wire; the tube is closed at one end, and has a bulb containing diluted sulphuric acid into which the poles of the line wires are inserted. A method of connecting and disconnecting an alarum from the circuit in the needle telegraph, by a bolt connected to the alarum circuit raising a spring in the needle coil circuit, is described and shown.

Methods of ascertaining the precise place of injury to the line wires are described and shown; the coils of needles, mounted as in the needle telegraph, are included in the circuit between two of the line wires, one of which is defective, a station battery being connected to them; various points in the circuit are tried until one is found at which the needle is not affected; half the distance between this and the last effective point is then tried until the injury is found. A voltameter may also be used to test the completion of the circuit. To distinguish between the line wires, it is proposed to use varnish of various colors.

[Printed, 2s. 9d. See Repertory of Arts, vol. 11 (*new series*), pp. 1 and 94, also vol. 17 (*enlarged series*), p. 365; London Journal (*Newton's*), vol. 30 (*conjoined series*), pp. 46 and 201, also vol. 36 (*conjoined series*), p. 130, also vol. 38 (*conjoined series*), p. 223; Mechanics' Magazine, vol. 34, p. 433, also vol. 54, p. 131; Engineers' and Architects' Journal, vol. 4, p. 237; Patent Journal, vol. 8, p. 264, also vol. 9, p. 50, also vol. 11, pp. 56 and 166; *Law* Journal Reports (Common Pleas), vol. 20, p. 123; Common Bench Reports, vol. 4, p. 462, also vol. 10, p. 838; and Rolls Chapel Reports, 7th Report, p. 187.]

A.D. 1837, December 4.—N° 7495.

BOOKER, Thomas William.—"Improvements in preparing "iron to be coated with tin and other metals." "A mode of "heating the pickling liquor (diluted acid), and in preparing "iron plates to be coated with tin and other metals, in such "manner that the heat can be more uniformly kept than when "heated by the direct action of a fire, by which greater uniformity "of production be ensured;" and "a mode of submitting sheets "of iron in such manner to the action of the pickling liquor as to "ensure their being kept separate, notwithstanding a number of "plates are in the pickling trough at one time, the sheets being "put into the pickling trough one at a time."

Over a fireplace having a door, ashpit, side flue, and chimney, is placed an exterior vessel containing a smaller vessel of lead, having a space all round it filled with water; the pickle (dilute sulphuric

acid) is within the leaden vessel, and is thus subjected to the uniform heat of boiling water.

To keep the plates separate they are placed in "grates" of lead or wood having divisions, two in each division, but not in contact with each other. Every plate is dropped "on its lateral edge "singly and separately." After pickling, the sheets are plunged into water and "remain to be taken as wanted for the further pro- "cesses of coating with tin or other metals."

[Although no mention of electricity is made in the Specification, the immersion of the iron plates in the dilute sulphuric acid in contact with the vessel of lead, generates an electric current in which the iron is the positive plate, and which therefore assists in and is favourable to the process above described.]

[Printed, 6d. See Repertory of Arts, vol. 10 (*new series*), p. 80.]

A.D. 1838, April 18.—N° 7614.

COOKE, William Fothergill.—"Improvements in giving "signals and sounding alarums at distant places by means of "electric currents transmitted through metallic circuits." This invention may be divided into the following parts:—

Part A.—An intermediate signal apparatus that can transmit signals to either terminus as well as receive signals, being an improvement on the 5th particular of N° 7390. At the intermediate station, finger keys and a galvanic battery are connected to the intermediate apparatus, and thence suitably to the line wires, in order to communicate to stations in one direction or the other by means of a "current director," adjusted by an "index" or button on the outside of the signal apparatus. The current director consists of a wooden lever, to which wires from the key board are attached at the side, being insulated from each other; according as the current director is moved up or down from an intermediate position, it makes communication with fixed insulated springs, in connection with the line wires, to stations in one direction or the other, thus placing the finger keys in the circuit. When the current director is in an intermediate position (*i.e.* not in contact with either set of fixed springs), the line wire circuit is completed only through the needle coils, and signals can be received, as the communicating springs are not then pressed apart by the current director. The tail of the current director, by means

of springs in a similar way, introduces the battery of the intermediate station. The signal instrument, described in connection with this part of the invention, has four needles and five line wires.

Part B.—Connecting the alarum apparatus of an intermediat station, during the time it is transmitting messages, so as to receive audible signals from stations in an opposite direction to that receiving signals from it. The current director carries a flat plate or "cross piece," at the opposite side to those connected with the keyboard, that makes connection with the opposite line wire circuit to that engaged in transmitting messages, and its return wire. The index also carries a wooden prominence, that at the same time makes contact with springs in the line wire circuit and the alarum apparatus, the wooden prominence for that purpose carrying insulated metal pieces in connection with the alarum circuit.

Part C.—Temporarily connecting a portable apparatus with the line wires to give and receive signals. At certain portions of the telegraph line the wires are carried up into boxes, and are fitted with connecting pieces that can be removed, in order to include in the circuit a battery and signal instrument when required. In connecting a portable apparatus, a block of wood, with insulated springs carrying the junction wires, is locked into the box by a cross bar passing into the notched groove used to lock its door. The signal apparatus described is only a double instrument having three line wires, and is connected up or down the line by a current director, turning half round on an axis, but on the same principles as that described in Part A. The keys described in connection with this instrument consist of small levers or finger tappets, each poised on a distinct centre pin of its own, and arranged so that the depression of the key corresponds to the deflection of the needle; this key is the same in principle as that described in N° 7390, but the application is different. Contact with the cross bar (or the continuity of the line wire) is broken by the flexure of a watch spring on the lever arm.

Part D.—Securing and protecting telegraph wires, by laying them in, or drawing them into, tubes or pipes, as gas pipes, soldered together, or screwed together with screw joints or union joints.

Part E.—Using magnetic attraction, with or without the aid of gravitation, to steady telegraph needles.

Part F.—Sounding alarums without the assistance of a local battery. The fly of a clockwork actuating the hammer is released by the deflection of a magnetic needle acting on a delicately poised lever, which has an arm that cannot resume its position until a stop on the lever is allowed to enter a notch in a slow moving wheel. The telegraph needles may be used for this purpose.

[Printed, 2s. 4d. See Repertory of Arts, vol. 11 (*new series*), pp. 129, 231, and 300.]

A.D. 1838, July 4.—N° 7719.

DAVY, EDWARD.—" Improvements in apparatus for making " telegraphic communications or signals by means of electric " currents, parts of such apparatus being applicable to obtaining, " regulating, or measuring electric currents for other purposes," consisting of :—

A chemically marking telegaph. A local circuit (completed by galvanometer needles acted on by the line circuit) marks chemically prepared paper, which is moved forward by clockwork released by an electric magnet. Two line wires are used to convey the electric current, and one return wire, with a battery and two galvanometers (deflecting opposite ways) to each wire ; the battery to the return wire giving a preponderance to currents through that wire, twelve different signals can thus be produced. The action is as follows :—On one or more of six keys being pressed down, either two or three of the galvanometers act ; and as the three wires admit of the current proceeding in either direction through them, it can complete either two or three out of the six circuits of the local battery ; thus marking longitudinally, properly prepared paper at two or three out of six places. The clock-work escapement, for moving the paper a sufficient distance between the signals, consists of two levers, one of which carries the armature, and works on a horizontal axis carried by the other lever. When the armature is attracted, it releases a pin from a notched fly vane, and enables it to move half a revolution ; and when the current ceases, the pin is again removed, and replaced by lateral motion given to the second lever by a wheel pressing against a projection on it. Calico "impregnated with hydriodate of potash and muriate of lime " is preferably used to receive the marks or signals.

" Relays of metallic circuits," transmitting the electric current throughout, in the desired direction, brought into operation by means of galvanometer needles as in the above-described telegraph.

An arrangement enabling the person communicating, to send the communication to any desired place. Branch wires are laid to each place, and the circuit is completed to the desired place by the assistance of electro-magnets acting on a lever or levers according to the direction of the current. These magnets are charged by a local circuit, completed by galvanometers, as above.

An improved galvanometer, in which the magnetic needle is mounted on a horizontal axis; the strength of an electric current is ascertained by the weight it will overcome in a scale attached to the needle, or by a sliding weight.

[Printed, 1*s*. 6*d*. See Repertory of Arts, vol. 12 (*new series*), p. 1.]

A.D. 1838, July 11.—N° 7729.

CALLET, Louis Cyprien (*a communication*).—The title of this invention is:—"Certain improvements in machinery or apparatus "for producing motive power, applicable to propelling boats and "other vessels, carriages, machines, and other useful purposes." This invention relates to motion obtained by means of soft iron or steel cores or "bolts," moving reciprocally within electro-magnetic "helices."

This invention consists of a "bolt" or bolts attached to the extremities of a beam, similar to that of a Boulton and Watt's steam engine, and working into helices in a similar manner to that of the piston and cylinder of the steam engine, the helices being fixed to the foundation plate of the machine. Motion of the "bolts" at each extremity of the beam is produced by the galvanic current being admitted alternately to the helices at the opposite extremities of the beam; this is accomplished by means of "straps," or "thin slips or bars of copper, tin, or silver," pressing upon a "wooden cylinder or wheel" on the crank shaft, having two "pieces of silver" inserted in the wood which complete the electric circuit with each helix or set of helices alternately, and thus produce motion.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 154.]

A.D. 1838, July 18.—N° 7737.

HOE, Richard March (*a communication from Dr. H. H. Sherwood*).—This invention relates to an instrument containing a

"dipping needle," with graduated vertical and horizontal arcs and tables, by which "the latitude or longitude of any place on land, or "of a ship at sea, may be ascertained and determined without the "aid of celestial observations, and also the dip or inclination and "variation of the magnetic needle ascertained." The instrument is called "'Sherwood's magnetic geometer.'" The inventor states that he has constructed the above-mentioned tables from the latitude and longitude of the northern and southern magnetic poles, their rate of motion, and the position of the line of no variation at a given time, as determined by himself.

Two instruments are described and shown:—One, in which the dipping needle is a "rhombus," mounted upon agate centres within a vertical arc having spirit levels; it also has a horizontal arc and moveable nonius, and several moveable concentric circles of figures, so arranged as to bring the different figures required in calculation one above the other. Another, in which a "magnetized "ring" is used, carrying two verniers and supported on agates; "two forked pieces of brass," that can be raised or depressed by moving a slide, place the axis of the magnet at right angles to the vertical divided circle. For observations at sea the instrument must be "suspended by universal joints," or "a liquid bath." The moveable concentric circles of figures consist of 9 circles nearest the centre of the instrument, containing "a table of one-"half the diurnal variation in every latitude;" next to these, 6 circles, containing a table of "the declination of the needle "from nothing to its maximum of 23° 28′ at the terrestrial "equator;" and externally, next to the nonius circle, 6 other circles giving "the declination of the magnetic axis, or line of no variation, "in which the declination of the needle from nothing to 90° is "converted into degrees of longitude." Copious examples are given of the obtainment of the variation of the needle, and latitude and longitude of places, from the instrument and table, but there is no special explanation of the precise method of working them.

[Printed, 11*d*.]

A.D. 1838, July 24.—N° 7742.

ELKINGTON, George Richards, and BARRATT, Oglethorpe Wakelin.—"Improvements in covering and coating "certain metals," in which improvements electric force is used.

To coat copper and brass with zinc, "to prevent oxydation:"— "Zinc in the state of powder or pieces" is added to dilute muriatic acid, and allowed to remain "until the acid and zinc cease to act "upon each other;" this solution is then poured off and boiled with comminuted zinc, during which time the articles to be coated are immersed in the solution, and brought into "contact with the "metallic zinc," when they speedily become coated, and are then removed, washed, and dried.

To coat iron and steel with the above solution:—The articles are previously coated with copper, by cleansing them in dilute sulphuric acid, and immersing them in a solution of sulphate or nitrate of copper, whence they are speedily removed and washed; or they may be at once immersed in the muriatic acid solution in contact with the excess of zinc, removed, washed, and dried. In either of the above processes the copper surface may be "introduced into a "dilute solution of nitrate of mercury and then again boiled in "the solution of zinc," by which the same object is obtained.

"Iron, steel, copper, brass, &c." are coated with an "amalgam "of zinc" "to prevent oxydation," by immersion in contact with the amalgam to which dilute acid has been added. Muriate or sulphate of ammonia, or the oxides of the metals, may be employed instead of muriatic acid, or other acids may be used; or the amalgam of zinc may be employed "in a melted state." Coating by fusion may be employed in conjunction with the above processes.

Iron or steel is coloured to imitate brass, by coppering and zincing it as above described, and submitting it to heat in a closed oven until the required colour is obtained, as in "semiloring" copper and brass.

[Although no mention is made of electricity in the Specification, the immersion of the metal in the solution of zinc in contact with zinc or amalgam of zinc, forms a galvanic circuit, and thus employs electric force.]

[Printed, 4d. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 79.]

A.D. 1839, June 8.—N° 8096.

DE BODE, BARON HENRY.—"Improvements in the means of "rendering magnetic needles less prejudicially influenced by "local attraction, which improvements are applicable to other "magnetic objects for the same purposes."

A mariners' compass is described and shown, in which the needle and card are supported by a pivot cemented to "a double glass "vessel," containing "quicksilver," so as to get "a metallic surface "of quicksilver within two surfaces of glass between the magnetic "needle and the local quantity of iron." This glass vessel "is "placed within an outer vessel of lead, consisting of two thicknesses "of lead, which is a metal little effected by the attractions or fluids "which influence the magnetic needle, and there is, by preference, "a thickness of glass between the double lead vessel." "The "compound vessel containing the compass is suspended on the "ordinary gimbles" by means of "a brass strap." A concave glass forms a "corner" [cover?] to the vessel, thus allowing "more play to the card," but preventing "its being thrown off "the point."

A chronometer may be placed in such a vessel, to prevent "the "errors which have been found to be produced by magnetic "influences."

[Printed, 5d. See Inventors' Advocate, vol. 1, p. 291.]

A.D. 1839, August 26.—N° 8207.

PINKUS, Henry.—Methods of applying and using the power derived from the pressure of the atmosphere, by means of a partial vacuum called the "pneumatic atmospheric auxiliary power," and the impelling force to be derived from "explosive mixtures" (carburetted hydrogen gas in union with air) called the "gaso-"pneumatic power."

The Specification and Drawings describe and show, at great length, the following particulars :—

A method of applying the above motive powers to the various operations of agriculture, by means of "hermetically sealed mains "or pipes" laid down in the fields, which, in the first case are exhausted of air by a stationary engine, and in the second case conduct gas from the stations to the various parts in which the power may be required.

A *locomotive* "atmospheric impelling engine," and a locomotive "gaso-pneumatic engine" connected to the mains by flexible tubes.

Various agricultural implements connected with the "impelling "engine," ploughshares attached to levers, harrows, scythes and spades.

In the application of the invention to railways, canals, and common roads, "close tubes" are laid down, which are connected at certain distances with "valve mains," having longitudinal valves formed by metal valve plates pressing together, and placed angularly on the main over a longitudinal aperture, so as to admit a "flat pipe or tongue" between them from the locomotive. A valve may be made by having one valve plate of leather strengthened with copper plates, whose upper edge lays in a groove in a "raised vertical surface;" the groove contains an insulated copper wire, which is included in a galvanic circuit by a "conductor" projecting from the locomotive, thus melting cocoa-nut oil in the groove, as the train passes, "in advance of the "locomotive;" the galvanic batteries may either be on the locomotive or at stations along the line, in which case a wire is laid parallel to the gas valve main; this last valve may extend the whole length of the railway.

"The pneumatic principle may be applied" to agricultural purposes by means of "a plenum instead of a partial vacuum."

[Printed, 4s. 2d. See Inventors' Advocate, vol. 2, p. 195.]

A.D. 1839, October 24.—N° 8248.

GRAYDON, George.—The title of this invention is:—"Certain "improvements in instruments for which Letters Patent were formerly granted to me, and which were called therein 'A new compass for navigation and other purposes,' part of which improvements are applicable to instruments for measuring angles at sea "or on shore by aid of reflection or refraction, or of reflection "combined with refraction, and part are applicable to magnetic "compasses for ascertaining true bearings from celestial observations, and for comparing the same with the bearings of the "magnetic needle contained in such compasses, whereby to determine and be enabled to allow for the deviation of such needle "from the true meridian, whether by variation, local attraction, or "other cause of error;" but it only refers to magnetic compass needles and cards as a part of the "celestial compass" alluded to in this Specification. For the former invention alluded to, see Letters Patent, N° 4996. "The compass bowl," "carrying the "measuring circles of the celestial compass," has a pendulous weight, and is suspended on "a series of gimbal rings" (three are shown in the Drawings), with weights attached to them, so as to

act as pendulums of different lengths, and thereby prevent the motions of one from being communicated to the others, and keep the instrument horizontal. In another modification of the invention, the weighted compass bowl is mounted on the vertex of a weighted cone, which is on the vertex of another weighted cone, on a central pivot; the weights being so disposed as to act as in the gimbal compass first described. A method of ascertaining the variation of the magnetic needle by this instrument is set forth.

"An instrument for measuring angles by reflection after the "mode of Hadley's sextant, but instead of refering those angles "to the visible horizon of the sea by directing the telescope," "or "line of sight to view that horizon, the same is directed to view "the pole star," is also described and shown.

[Printed, 2s. 8d. See Inventors' Advocate, vol. 2, p. 275.]

A.D. 1839, November 2.—N° 8255.

TAYLOR, William Hannis.—"Improvements in obtaining "power by means of electro-magnetism." The Specification and Drawings describe and show rotary engines, in which, either the "armatures" are fixed, and the electro-magnets revolve, or *vice versâ*, these being arranged in the circumference of a circle, so that the magnets or "armatures" (as the case may be) may freely move near to the "armatures" or magnets opposite to them. The magnets are demagnetised when opposite each armature, and until within the attractive influence of the next armature, thus producing a continuous rotary motion. A conducting disc, inlaid with non-conducting material and in connection with one pole of the galvanic battery, magnetises and demagnetises the electro-magnets at the proper times; and by arranging the conductor in connection with the disc communicating with the electro-magnets, and thence with the other pole of the battery, in different relative positions, the engine may either move in a forward direction, be stopped, or reversed. No change of magnetic polarity takes place in this engine.

[Printed, 1s. 2d. See Mechanics' Magazine, vol. 32, p. 694; also, vol. 33, p. 53 and Inventors' Advocate, vol. 2, p. 292.]

A.D. 1840, January 21.—N° 8345.

WHEATSTONE, Charles, and COOKE, William Fothergill.—"Improvements in giving signals and sounding alarms at "distant places by means of electric currents," consisting of:—

A signal apparatus, by which the letters of the alphabet are presented at an opening in a dial plate, by means of an electro-magnet in the circuit which acts upon the pallets of an escapement similar to an "'echappement à cheville,'" put in motion by independent clockwork. When the electric current passes, the electro-magnet attracts a keeper attached to the end of a "sliding spindle" carrying the pallets, which action takes away the detaining pallet, releases a tooth of the escape-wheel on the dial axis, and brings the other pallet into action, so that the wheel is advanced only half a tooth. On the electric current ceasing, a spring restores the sliding spindle to its original position, and enables the escape-wheel to advance another half tooth; and so on until the required signal appears at the dial plate opening, when a pause is made, and the same process gone through for the other signals. The escape-wheel may be driven without clockwork, by means of spring pallets (attached to a sliding spindle parallel to its axis) in connection with the electro-magnet and reacting spring. A magnetic needle and coil may also be used (by reversing the electric current) in connection with pallets and an escape-wheel, to give motion to the dial.

A "communicator," having a dial plate similar to that of the signal apparatus and radial arms to work it, one to each signal. Under the dial is a metallic circle inlaid with wood, the metal of which is connected with one circuit wire, the other circuit wire from the battery being only brought into metallic contact with it when a spring is in contact with the metallic portion of the circle. The rotation of the dial plate by the operator makes and breaks the circuit alternately, so that when this instrument is used in connection with the signal apparatus, it moves the disc according to the signals required to be given. When the communication is finished, the dial plate is made to indicate blank, and the main circuit is completed by means of a single inlaid piece of metal in a wooden circle against which a spring presses, thus enabling signals to be received; at the same time connection with the battery is broken.

An electric alarum. In the signal apparatus, the electro-magnet is mounted upon a "slider," so as to be moved, by a suitable "stem," opposite to another piece of soft iron fixed to a sliding spindle (carrying a detent) that releases the fly-wheel of the alarum clockwork whenever the electric current passes round the magnet in that position. This train has a "serrated wheel," which "by acting on suitable pallets, moves the hammer of the alarum "backwards and forwards so as to strike the bell."

An alarum apparatus, in which a hammer is made to strike upon stop at certain regular intervals by clockwork always in motion; hen a magnetic needle is deflected by the completion of the rcuit, it places itself against a detent, so that the hammer strikes pon it, releases the clockwork, and enables the alarum to sound. n electro-magnet and keeper may be used, instead of the coil and eedle, to enable the hammer to act on the detent.

A magneto-electric machine, that may be used in connection ith the signal apparatus above described. The current is made circulate in one direction by means of an inlaid wooden disc on e axis of the armature, in connection with springs in metallic ntact with the main wires; the disc is inlaid with two insulated etallic semicircles respectively in connection with each terminal f the armature coil; thus the to-and-fro current generated by the achine is reversed. The machine is driven by a cog-wheel and nion, the cog-wheel having twelve pins, so disposed that, by the otion of the wheel through a space equal to the distance between em, the armature moves through half a revolution. Twelve gnals are thus made without the "communicator," and are all at this machine can make with the above described signal apparatus, as its electric current is only of momentary duration, and e electro-magnet cannot act a sufficient time to convey a signal y stopping the pointer.

A signal apparatus, in which the force of two electro-magnets in e circuit is made to act, through pallets and an escape-wheel, a hand or moveable dial without the reaction of a spring. The llets have a tail-piece (free to vibrate between the poles of the two ectro-magnets) which is attracted to one of the electro-magnets hen the instrument is at rest, in consequence of the circuit inuding the electro-magnets being then closed; by this means the ockwork is prevented from running down. Three main wires are ed with this instrument; one which connects dissimilar poles of e batteries; a second connecting similar terminals of the "right-handmost" magnetic coils; and a third connecting similar rminals of the "left-handmost" magnetic coils. When the rcuit is completed through the two main signal wires so that each nveys half the electric current, both the magnets are excited and e signal apparatus can receive signals. The "communicator" is aced concentric with the dial, and the current is conveyed to the agnets alternately, or both at once, by means of a pinion whose

axis carries a metal wheel inlaid with wood with which the remain ing battery wire is connected, and against which springs, connecte with the remaining coil terminals, press; the pinion is moved by toothed wheel on the dial axis. In order to enable intermediat stations to work this signal apparatus with the batteries at th terminal stations, the intermediate apparatus have two inlaid meta wheels, one for each magnet; this instrument is portable. Th dial or hand may be worked by the electro-magnets only, a deten to ring an alarum (when a stop is pulled out) may be released b the completion of the circuit without shifting the magnets, and th keepers of the magnets may be attached to the pallets themselve In all the above signal apparatus, either a dial revolving behind perforated dial-plate, or a hand revolving over a fixed dial-plate may be used. Letters Patent, Nos 7390 and 7614 are re ferred to.

[Printed, 2s. 11d. See London Journal (*Newton's*), vol. 30 (*conjoine series*), pp. 116 and 201; Inventors' Advocate, vol. 3, p. 99; and Commo Bench Reports, vol. 4, p. 462.]

A.D. 1840, March 3.—N° 8407.

SHORE, Joseph.—" Improvements in preserving and covering " certain metals and alloys of metals."

This invention "relates to a mode of obtaining or applying " permanent covering of copper or of nickel by means of galvani " batteries on articles manufactured of wrought or cast iron " tin, lead & copper, and of alloys of such metals, such covering " acting as a preservative to some of those metals and alloys o " metals, and in other cases as a superior surface." For this pur pose "an open vessel" " of wood or of earthenware," divided "in " two compartments by a partition of unglazed earthenware " other porous substance," is taken. Into one of the compa ments "pure water slightly acidulated by preference with sulphu " acid," is placed; and into the other, a solution of " sulphate " copper or nitrate of nickel, whichever is to be used, as " covering metal." These metallic solutions must be " kept up " a neutral strength." A piece of zinc is placed in the first-me tioned compartment, and connected by a copper wire to the arti to be covered, which is placed in the metallic solution.

The articles are, preferably, cleansed by submitting them to a lo red heat when covered with sand, charcoal, or black lead, in

crucible, and "permitting the same to cool" before covering them.

The solutions may be either used hot or cold, and "the longer "the articles are under operation the thicker the covering." Large articles are covered separately, "small articles, such as iron "nails" [nails?], are placed in a wire "basket" connected by a wire to the zinc plate. The article should be "moved, from time to "time, to prevent any part or parts being left uncovered."

[Printed, 3d. See Repertory of Arts, vol. 14 (*new series*), p. 353; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 82; and Inventors' Advocate, vol. 3, p. 162.]

A.D. 1840, March 25.—N° 8447.

ELKINGTON, GEORGE RICHARDS, and ELKINGTON, HENRY.—"Improvements in coating, covering, or plating certain metals," consisting *of*:—

1st. "Coating," &c., "copper and brass with silver," by immersing the article, cleaned and silvered (See Letters Patent, N° 7496, or the second improvement herein-after mentioned), in a solution of nitrate of silver; expelling the acid by heat; and fusing on the coating by immersion in fused borax; the cooled article is then boiled "in dilute sulphuric acid" "until the adhering borax "is all dissolved." "For a finish," the article is preferably electro-coated with silver, as herein-after described.

2nd. "Coating," &c., "metals with silver." The cleaned articles are, by preference, immersed in a solution of oxide of silver in "prussiate of potash (cyanide of potassium)" by boiling. For a thicker coat a galvanic current is used, by means of a single cell apparatus. Oxide of silver must be added "from time to time." "Prussiate of soda or other analogous salt," or "pure ammonia" may be used either with or without a galvanic current, or a "neutral salt" of silver in connection with a galvanic current, the article having previously received a thin coating by the "cyanide "of silver" solution.

3rd. "Coating," &c., metals with gold. The cleaned articles are, preferably, immersed in a solution of comminuted gold, or oxide of gold, in "prussiate of potash" by boiling. For a thicker coat a galvanic current is used as described for silver. The solution must be kept "saturated with gold." Double and "haloid salts" of gold, and oxide of gold, or metallic gold dissolved in "any

" soluble prussiate," or "any other analogous salt," may be used, either with or without a galvanic current, as for coating with silver. In these two last-mentioned improvements the article may either be of metal or coated with metal.

4th. Iron is prepared "for receiving a coating of copper," &c., by immersing it, connected with a strip of zinc, in dilute sulphuric acid, thus causing it to be "electro-negative" whilst cleaning. It is then placed in a "brass vessel" containing an acid solution of sulphate of copper, and having thus received "a thin film," is ready to be covered with any metal by a galvanic arrangement similar to that described for silvering, or "by other known means."

[Printed, 5*d*. See Repertory of Arts, vol. 16 (*new series*), p. 239; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 83; Mechanics' Magazine, vol. 33, p. 397; and Inventors' Advocate, vol. 3, p. 228.]

A.D. 1840, May 7.—N° 8499.

GROVER, HENRY MONTAGUE.—"An improved method of re-" tarding and stopping railway trains."

This invention consists "in the application of the powers of an " electro-magnet, or of electro-magnets, or of magnetism gene-" rally, whether applied directly or indirectly to any wheel or " wheels upon which a train or any portion of a train of carriages " or other vehicles upon any railway moves, or in any other man-" ner." The Specification and Drawings describe and show an electro-magnet "applied to the face of the tire of one wheel of a " railway carriage, called a truck." An electro-magnet is fitted into a wooden block or box, covered with a lid, and is suspended from a transverse rod at the bottom of the truck, so as to hang within "half an inch, more or less, according to the power of the " magnet from the tire of the wheel." On the connection of the wires from the battery, which is placed in the truck, the adhesion of the electro-magnet to the tyre of the wheel "will impede or " totally prevent its turning round, and thus retard or stop the " train of which the carriage, the wheel of which is thus acted " upon, forms a part. Any number of the wheels of a carriage or " train may, of course, have these magnets applied to them, and " the retarding of each such wheel will be in proportion to the " power of the magnetism so elicited and applied."

[Printed, 6*d*. See Mechanics' Magazine, vol. 33, p. 479; Inventors' Advocate, vol. 3, p. 307; and Engineers' and Architects' Journal, vol. 3, p. 429.]

A.D. 1840, August 27.—N° 8610.

LOCKETT, Joseph.—" Certain improvements in manufacturing, " preparing, and engraving cylinders, rollers, or other surfaces for " printing or embossing calicoes or other fabrics," relating to :—

1st. The application of galvanic electricity to " recoating, " covering, or thickening " the cylinders, &c., used for calico printing; or to make new cylinders. This is done by taking a " mould or shaft," which may either be a conductor of electricity and " retained as a portion of the cylinder," or a non-conductor " subsequently rendered a conductor " by any of the usual means, " and then removed from the cylinder when it has attained the " requisite thickness." The " mould " is then covered with copper by the ordinary process of electro-deposition.

2nd. A " method of preparing surfaces by galvanic or voltaic " electricity, applicable to cylinders, plates, or blocks for printing " or embossing calicoes and other fabrics." When any of the engraved ground is required to be obliterated or " rendered plain," those portions are left exposed, whereas the rest of the surface is coated with varnish; the exposed part is then coated with copper by galvanic agency in the usual manner.

3rd. A " mechanical contrivance " for " cleaning, filing, or " turning off the superfluous portions of the copper thus deposited " upon rollers or cylinders." This consists of a " rotary cutting " or filing tool " applied " either to the ordinary slide lathe or the " engraving machine commonly used for cylindrical engraving " and acting upon the cylinder, the cylinder being properly " sup- " ported by and revolving on the mandril " of the lathe. The " filing tool " is carried " from end to end of the roller " by a screw extending the whole length of the lathe, " or it may be " slidden to any part of the bed by hand or otherwise," and has proper adjustments for regulating its speed and depth of cut.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 89; Mechanics' Magazine, vol. 34, p. 221; and Inventors' Advocate, vol. 4, p. 150.]

A.D. 1840, September 10.—N° 8625.

DENT, Edward John.—" Certain improvements in clocks and " other timekeepers," consisting :—

1st. " In giving the impulse to the pendulum of a clock at the " centre of percussion, or as near as practicable to that centre."

2nd. "In producing a compensation for the expansion and con-
" traction of the length of the pendulum arising from changes of
" temperature, by causing the arcs of oscillation to vary in an
" inverse ratio to the variations of the length of the pendlum"
[pendulum?].

3rd. "In combining three or more main springs and barrels to
" act simultaneously, without the medium fuzee, upon the train of
" wheels of a chronomer" [chronometer?] "or other timekeeper."

4th. "In connecting three or more main spring arbors with a
" common arbor, whereby all the springs may be wound up at the
" same time by one application of the key."

5th. "In withdrawing, as much as practicable, the atmospheric
" air from the interior of an air-tight case containing a chronometer,
" and in filling the space with a dry non-corroding gas such as
" hydrogen."

6th. "In *the application of the well-known voltaic or electro-
" metallurgic process* to the depositing of a thin film of gold or
" other metal, incorrodible by the atmosphere, upon the steel
" balance spring and the compensation balance, the surface of
" which having been cleaned with alkali or acid immediately
" previous to the application, in order that the metallic adhesion
" may be perfect and rust prevented, and consequently one cause
" of variation in the rate of chronometers is thus avoided."

[Printed, 9*d*. See Repertory of Arts, vol. 15 (*new series*), p. 280; Mechanics' Magazine, vol. 34, p. 249; and Inventors' Advocate, vol. 4, p. 180.]

A.D. 1840, September 24.—N° 8644.

PINKUS, Henry.—"Improvements in the methods of applying
" motive power to the impelling of machinery, applicable, amongst
" other things, to impelling carriages on railways, on common
" roads or ways, and through fields, and vessels afloat, and in the
" methods of constructing the roads or ways on which carriages
" may be impelled or propelled," relating to :—

1st. "Propulsion on railways" by means of the "gaso-pneu-
" matic" force.

2nd. "Propulsion on canals" by means of the "gaso-pneu-
" matic" force.

3rd. "Applying the aforesaid gaso-pneumatic principle to im-
" pelling machinery, to wit, the impelling engine described in my
" said former Specification, dated twenty-fifth day of February

" 1841," [Does not this refer to N° 8207, which was enrolled February 25, 1840?] and to "the purpose or purposes of a fire-" engine."

4th. "Effecting propulsion" on railways or canals by "steam " power, in combination with the same, or parts of the same " impelling machinery or apparatus, in lieu of gaso-pneumatic " power."

5th. Effecting propulsion on railways, common ways, and canals, and through fields, by the application of electrical force, however generated.

This invention is applied to agricultural purposes, by either erecting a central station in which "an electric battery or batteries" are placed, or constructing "wells or tanks" too deep in the ground to interfere with agricultural operations; from which pipes containing bundles of insulated wires are laid, having at convenient places "vertical branches" with "boxes" in which are the loose ends of the wires; the wires are colored to distinguish their electric polarity. "To put implements into action," a locomotive engine is constructed, with a drum carrying and winding up the battery wires, and a "Taylor's," (See Letters Patent, N° 8255?) or any other electro-magnetic engine.

Trains are stopped by electric agency as follows:—Batteries are placed at convenient distances along the line, and between each line of rails a light hollow "railway bar" is laid (in half mile lengths) having continuous bars of wood carrying two copper strips insulated from one another; the copper strips are in connection with two insulated wires in the interior of the hollow rail, thence with one of the batteries. By means of "an electro-mag-" netic coupler" "composed of two masses of copper" insulated from one another, and suspended by a moveable joint to the locomotive engine, the stationary battery is connected at will with a "Taylor's," (or any other) electro-magnetic engine on the locomotive, which enables any person having charge of the railway to shut off the steam and blow the whistle. The "Taylor's" engine acts on the shut-off valve and steam whistle by means of a pulley, cord, and lever. A similar apparatus may be placed in the break carriage, and actuate the break when required. An electro-magnetic break is described, in which "a flexible armature," of "thin " laminated plates lying one on another," is attracted to an electro-magnet, and actuates suitable levers. To prevent collision, a battery

on the locomotive may complete the circuit, whenever it gets on the same half mile length as another train, through the strips on the wooden bars. "Taylor's rotary wheel," or any other electro-magnetic engine, may be used as "the moving power on a loco-"motive engine," "by taking up the electric force from the wires" laid down between the rails.

An electro-magnetic beam engine is described and shown, consisting of electro-magnets with horizontal surfaces, on each side of the beam, acting alternately on a "flexible armature" "formed "of thin laminated plates lying on one another," with one edge of which they are connected, thus enabling the beam to vibrate, and rotate a fly-wheel. This engine has a circuit breaker, consisting of a weighted lever in contact with one or other of two plates, according as a hammer jointed to an excentric stud on a rotating "circular cam" rests upon the lever plate or not.

The electro-magnetic force may be used on canals by means of the "dynamic impeller;" this consists of a frame travelling on a "suspension rail" (one of which is laid on one or both margins of the canal). To keep it properly balanced on the suspension rail, the dynamic impeller has, besides "travelling wheels," "adhe-"sion wheels" bearing against the sides of the rail, on whose axis pullies are attached, that carry a "cord or tow rope" passing round a pulley in the vessel; there are also weights to keep the principal weight below the centre of gravity. The wooden bars carrying the battery wires are supported on each side of the rail, and an electro-magnetic engine may be placed either on the "impeller" or in the vessel.

The electro-magnetic force may be applied to railways by means of a "differential railway." Fixed engines, erected at suitable distances apart, give motion to bands passing round horizontal wheels mounted between the rails, the bands thus traversing beneath the carriages. The motion is communicated to the carriages by pullies or "impelling wheels," in a trench, at certain distances apart, which work into a flange bar at the bottom of the carriages.

The electro-magnetic force may also be applied to putting "impelling engines" in motion, in manufactories, by establishing "electric metallic circuits" from fixed stations containing batteries.

"The combinations of method and apparatus" set forth in this Specification for applying electric currents may be used "for the "purposes of lighting places."

"The valve main of the gaso-pneumatic railway" may be unsealed by a heated electric wire.

[Printed, 6s. 8d. See Mechanics' Magazine, vol. 34, p. 299; Inventors' Advocate, vol. 4, p. 213; and Engineers' and Architects' Journal, vol. 4, p. 174.]

A.D. 1840, October 1.—N° 8650.

TALBOT, WILLIAM HENRY FOX.—"Improvements in producing "or obtaining motive power" by means of galvanic electricity.

In one engine, the galvanic current is made alternately to generate the mixed gases from the decomposition of water under a piston, and to explode those gases, thus giving motion to a fly-wheel shaft.

In a second engine, a lever is moved downwards, and then up again, by means of an electro-magnet, and the reactive force of a rod free to move after the armature has reached the magnet. The temporary magnetism attracts the lever (it being fixed to the armature) till the armature comes into contact with the magnet; the electric current then ceases, but a rod (passing through a hole at the end of the lever) attached to a crank, continues moving, and on its upward motion raises the lever, which is then ready to be again attracted by the magnet. A variation of this plan is described and shown, in which the armature merely rests in the lever, and several magnets and armatures may be used; in this case the lever itself continues its motion after the armature is in contact with the magnet. Other plans may be used, in which only the armature itself is stopped, the rest of the machinery continuing its motion.

In a third engine, motive power is obtained by the alternate expansion and contraction of a gas, vapour, or fluid, heat being applied and withdrawn at proper intervals by a galvanic battery. A strong iron U-shaped tube, partially filled with mercury, has one leg in connection with a piston, the other leg closed at the end and filled with *solid* carbonic acid; this soon liquefies, a part becomes gaseous, and motion of the piston is produced by passing a galvanic current, at proper intervals, through a thin piece of metal (thus heating it) in the carbonic acid.

[Printed, 8d. See Repertory of Arts, vol. 16 (*new series*), p. 35; Mechanics' Magazine, vol. 34, p. 319; and Inventors' Advocate, vol. 4, p. 230.]

A.D. 1840, October 7.—N° 8656.

SPENCER, Thomas, and WILSON, John.—"Engraving "metallic surfaces" by means of "voltaic electricity."

The surface to be engraved is coated with varnish or "etching "ground;" the required drawing "is then made with a pointed "instrument;" the surface thus prepared is "put into communi-"cation with the copper or negative end of a voltaic arrange-"ment," and placed in a vessel containing a suitable solution opposite to a "conducting surface," "which communicates with "the zinc or positive end" of the battery. "During the process "the engraved plate may be withdrawn and examined," and, if necessary, replaced. "When some of the lines are required to be "fainter than others, such parts of the design may be stopped "out." Or the etching may be done in one vessel, by connecting the prepared surface with a surface electro-negative to it in a suitable solution. Or the prepared plate may be placed "in a solution "between the plates forming the poles or ends of the voltaic "apparatus."

[Printed, 5*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 88; Mechanics' Magazine, vol. 34, p. 333; and Inventors' Advocate, vol. 4, p. 245.]

A.D. 1840, October 15.—N° 8663.

PINKUS, Henry.—The title of this invention is, "An im-"proved method of combining and applying materials applicable "to formation or construction of roads or ways." The invention consists of:—

"Methods of combining materials so as to form foundations "as bases for superstructures of roads, ways, streets, or rail or "tramways, and applying to said combination fixtures so as to "suit said combinations or structures to the impelling of common "or improved vehicles thereon." Various modes of forming the foundation and superstructure of street and other paving of stone, brick, wood, asphalt, and "artificial granite" are set forth, and the structure is called "the textile or woven pavement."

"An improved locomotive impeller" for ascending inclines on railways, applicable "to any kind of locomotive engine, whether "of steam, gaso-pneumatic, or electro-magnetic." Two horizontal "adhesion wheels," affixed to the locomotive, are made to rotate with the same peripheral speed as the driving wheels, and

are pressed upon the inclined sides of a centre rail laid between the ordinary rails, thus assisting "the bite or adhesion of the " driving wheels of the locomotive." The motion is given to the adhesion wheels by bevil gearing connected with the crank shaft; and the pressure of the wheels on the sides of the centre rail (one on one side of the rail, and one on the other side) is regulated by levers that move the bearings of the axles of the adhesion wheels, which levers are under the governance of the engine driver, by means of a handle connected by "pauls," ratchet wheels, and a right and left-handed screw to the levers.

" Self-acting" and "self-regulating indicators;" for marking, printing, and recording at the station the times of trains' arrival at, departure from, and passing the said station; also for recording on the engine, whilst passing a station, "the time of departure of " a preceding train."

[Printed, 4s. 2d. See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 251; Mechanics' Magazine, vol. 34, p. 334; and Inventors' Advocate, vol. 4, p. 261.]

A.D. 1840, December 17.—N° 8743.

MABLEY, William Tudor.—Producing surfaces for "printing, " embossing, or impressing," by means of "electro-metallurgy."

1st. The production of a device suitable for printing, &c., such device "constituting one perfect or connected design produced " from an originally engraved or otherwise executed portion of the " said design," by obtaining as many moulds in relief of the portion of the engraved design as are required to form the complete design, placing them properly together so as to form the complete design, and electrotyping an entire plate therefrom fit for printing. Flanges, for joining the moulds together, may be obtained on the mould by fixing bars on the original design and depositing partly on them.

2nd. A mode of joining together printing plates, by electro-depositing metal in grooves formed at the edges intended to be united, the plates being in contact.

3rd. A method of "obtaining an extended surface to an " engraved plate" by taking a mould of it, "attaching thereto, as " described above, a plain metallic or other surface," and then electrotyping the whole.

4th. A method "of producing suitable surfaces as aforesaid" by taking "a flat metal surface," coating it with wax or other easily

removeable composition, tracing the design thereon, removing "those portions thereof down to the metallic plate that are "required to print," rubbing over this a conductor of electricity, and electro-precipitating metal thereon. The application of this method to a cylinder is also given, and plans are described in which a lithographic or other stone or soft metal is used to form the design upon.

5th. The removing from moulds of plates or blocks portions of the design thereon, in order to produce plates or blocks suitable for printing in various colours. Electrotype copies are obtained from the moulds, so that each copy contains only the portion of the design to be printed in one colour.

6th. Dies for embossing horn buttons. Electrotype copies of an original mould or die are taken, and mounted in blocks for use; various ways of mounting them are described, and a method of electrotyping die blocks from a mounted block, from wax moulds, and from buttons themselves.

7th. Various modes of mounting seals, bookbinders' tools, &c., by causing the electrotype to attach itself to the holder "in the act "of depositing."

8th. Setting up moulds of portions of seals and producing perfect seals from them by electro-deposition. Various applications relating to initials, &c., are described.

[Printed, 1*s*. 3*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 94; Mechanics' Magazine, vol. 34, p. 476; and Inventors' Advocate, vol. 4, p. 406.]

A.D. 1841, January 11.—N° 8783.

BARWISE, JOHN, and BAIN, ALEXANDER.—"Improvements "in the application of moving power to clocks and timepieces," consisting of:—

"A method of applying the pendulum of a regulating clock "or timekeeper for making and breaking alternately the electric "connection between the source of electricity and the electro-"magnetic clocks and timepieces." A "regulating clock" conveys an electric current and cuts it off periodically, by means of equidistant metal studs let into an ivory ring, over which a metal spring on the escape-wheel axis moves; the spring is connected with one battery pole and completes communication with various wires leading to electro-magnetic clocks, each stud having a wire. Sixty studs giving motion to sixty clocks, are shown, so that

each clock is moved once every minute if the pendulum beats seconds. A wire leads from each stud to one end of the coil of an electro-magnet in a clock or set of clocks, consequently every beat of the pendulum of the regulating clock will put in motion an electro-magnetic clock; the return wire to the battery is continuous, and is connected with the remaining terminal of the coil of the electro-magnet in each clock. The electro-magnetic clock consists of a train of wheels, the escape-wheel of which is moved one tooth by means of a spring and "catch spring," fastened at its bottom angle, connected with a soft iron armature, every time an electro-magnet is discharged.

A "method of working simultaneously a number of clocks." The pendulum of the regulating clock completes the circuit every time a spring which it carries, connected with one battery pole, passes over a "metal conductor" connected with the other battery pole. This plan requires more battery power than the former.

A means of winding up the going and striking train and setting the hands of a clock once every hour. Sixty electro-magnetic clocks are connected with the positive and negative wires from the battery and regulating clock, but each clock only forms a closed circuit once every hour, when a metal stud inlaid in a disc comes into contact with a spring. An electric current is made to traverse once every minute by the regulating clock, which acts on that particular electro-magnetic clock in which the circuit is unbroken. In the electro-magnetic clock, a horizontal sliding bar is free to move backwards and forwards, by the attraction to the electro-magnet of a keeper fixed to the bar, and the reactive pressure of "a gun-lock spring;" this bar carries spring catches, working into the teeth of ratchet wheels on the main-spring axes of the going and striking trains; thus partly winding up the main-springs. Attached to the sliding bar is an arm with prongs which take hold of a projecting pin on the disc fixed to the minute-hand spindle, and, by the sliding motion, set it to its proper time; when the electro-magnet is discharged, the pin is out of the way of the prongs.

A method of bringing the minute hand of an ordinary clock "(provided it deviate not more than a minute from the time of "the regulating clock) to exact time with the regulating clock," by actuating an electro-magnet whose keeper moves two clips working on pivots attached to the front plate of the clock; on the magnetism ceasing the clips are separated by a spring forcing the

keeper from the magnet. The circuit is completed at the proper time by a piece of metal inlaid in an ivory disc, over which a spring (in the circuit), fixed to the minute-hand axis, traverses. By varying the position of the spring in each clock a number of clocks may be set in succession.

"A mode of supplying the voltaic battery with sulphate of "copper or other suitable materials," by causing two rings, between which cups are free to turn, to revolve and bring levers on their axes into contact with a spring fixed on the battery cell, thus overturning the cups at certain times.

A number of wires for transmitting the above currents twisted together like a rope, "or the positive and negative wires are "twisted with hemp or other fibrous rope."

A timepiece worked solely by electro-magnetism. The electro-magnet acts on a keeper fixed on to the pendulum, which has a "catch spring" that works the "escapement wheel" connected with ordinary clockwork. A spring on a "sliding rod," worked by the pendulum by means of shoulders, comes periodically into contact with a "stud," and completes the circuit at suitable times.

Making a balance timekeeper transmit the electric current to other clocks, as in the first improvement, by a stud on the seconds wheel which passes over an inlaid ivory ring.

"The application of an electric current to the striking of a "clock." "The gathering palette wheel" "of the striking train, "which makes one revolution for each blow of the hammer on the "bell," has a projecting spring, which, striking against a stud, completes the electric circuit and causes the hammer to strike the bell; for that purpose the hammer rod carries an armature which is attracted to the electro-magnet whenever the circuit is completed.

"A method of giving motion to a number of clocks." "By "this method five" [three?] "long conducting wires are required." On a spindle of a pendulum or balance clock, a spring is fixed, connected with the positive battery wire, which moves uniformly over a fixed non-conducting disc, having two metallic half-circles, with which two long conducting wires are respectively in contact; the current is thus transferred to the wires alternately. Another long conducting wire returns the electric current. Each electro-magnetic clock has two electro-magnets each respectively connected with each positive wire; a soft iron frame is suspended between their poles containing "catch springs" that work the

clockwork. As soon as the frame of the first clock is attracted to its magnet it completes the circuit for the next clock, and so on; thus completing the circuit to as many clocks, in succession, as the time the regulator spring is in contact with one half-circle will allow. When the regulator spring moves over the other half-circle it puts into action the second set of magnets.

A combination in which a regulator clock, marking Greenwich time, enables uniform time to be shown throughout the country. A circuit to a distant station battery and regulator is actuated by the central regulator, that actuates a second, and so on. The clocks in the neighbourhood of each station may be worked as in the first improvement.

[Printed, 2s. 8d. See Mechanics' Magazine, vol. 35, p. 139; also vol. 39, pp. 65 and 97; and Inventors' Advocate, vol. 5, p. 71.]

A.D. 1841, January 14.—N° 8793.

JONES, Alexander.—"Improvements in the manufacture of "copper tubes and vessels." "Manufacturing tubes and vessels "of copper deposited or thrown down in the form and of the sub-"stance of the tube or vessel required to be manufactured, by the "action of voltaic electricity."

"A solid or other mould, of the diameter and form of the "required tube," is made of "wood, clay, earthenware, plaster of "Paris, wax, or other non-conducting substance," "or the mould "may be of lead or other metal fusible at a less degree of heat "than the copper of which the tube is to be formed." A non-conducting mould is made conducting by the application of nitrate of silver solution, the metal being afterwards reduced by immersion in a solution of proto-sulphate of iron, or by phosphorus, either in or solution in vapour; or plumbago, metallic leaf or foil, or bronze powder, may be used. The mould is then placed in a vessel containing a solution of sulphate or nitrate of copper, connected to the "positive plate" of a suitable galvanic battery, and "surrounded "by a cylinder of copper of a larger interior diameter than the "required tube," which cylinder is connected with the "negative "plate" of the battery; instead of a cylinder, "clippings, turn-"ings, or other refuse of copper," "placed in a frame of wicker "work," may be connected to the "negative plate" of the battery. When the deposit of copper, thus caused, is of the required thickness, it may be removed from the mould either by mechanical force

or by heat. It may be necessary to form vessels in separate portions, and afterwards to join the said portions, which may be done by galvanic electricity as follows:—Every part, except the edges to be joined and a small portion on each side, is coated with a "resinous varnish;" the parts are brought together as they are required to be fixed, the whole is immersed in the copper solution, and connected with the battery as aforesaid, with a copper plate in connection with the battery surrounding it. A single cell apparatus, with diaphragm and constant supply of sulphate of copper, may be used instead of a separate galvanic battery.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 106; Mechanics' Magazine, vol. 34, p. 399; and Inventors' Advocate, vol. 4, p. 324.]

A.D. 1841, January 23.—N° 8809.

BAGGS, Isham.—The title of this invention is:—"Improvements "in printing."

The invention relates:—

1st. To the application of "the chemical powers of electricity," "however obtained," "to the purpose of printing in one or more "colours." When "quantity" electricity is used, a design is prepared for printing by forming the parts of various metals or metallic alloys, this design is placed upon paper "slightly moistened" with a suitable chemical solution, and the paper is placed upon "the negative pole of an active battery;" on the connection of the metallic design "with the positive wire," electro-chemical affinities operate, and a coloured impression of the design is produced. When "electricity of high tension and small quantity" is used, a design is "formed upon a glass plate by cementing upon "its surface a number of small pieces of very fine platinum," or other metallic "wire, in consecutive order, so as to form a series; "it is then to be laid upon a sheet of paper moistened with any "appropriate solution," "and submitted to the action of a spark "or current."

2nd. "To a mode of employing tests in printing," by using paper moistened with solutions of various re-agents, when more colours are required than one re-agent can produce.

[Printed, 4*d*. See Repertory of Arts, vol. 16 (*new series*), p. 180; Mechanics' Magazine, vol. 35, p. 143; and Inventors' Advocate, vol. 5, p. 71.]

A.D. 1841, March 8.—N° 8865.

SPENCER, Thomas.—This invention is entitled "An improve-" ment or improvements in the manufacture of picture and other " frames and cornices, applicable also to other useful and deco-" rative purposes," and it relates to:—

1st. The "application of voltaic electricity" to the above purposes, by taking a mould from a model of the required design, and a copper electrotype from that mould. The mould may be either cast in any suitable substance or electrotyped. If the mould is not metallic it must have its surface made conductable, preferably, by giving it a "coating of thin varnish;" when nearly dry, "bronze " powder" is applied until the whole surface is "rendered " metallic." The electric apparatus may be a single cell, but preference is given to the battery process. When the deposit is thick enough, the copper frame may be removed "by a slight ap-" plication of heat." The back of the frame may be filled with solder, and a "rabbitt" fastened entirely round it for the picture and glass to be fitted into. The frame is then ready to be gilt, silvered, or covered with platinum.

2nd. The "application of voltaic electricity to the manufacture " of moulds" for casting "composition" and "papier mâché" ornaments, "also for casting glass, earthenware, and china." An exact model is fastened to a plate of polished metal or glass by varnish. The model and plate (if non-conductable) must then be " metallized" and electrotyped in copper, the electrotype may then be removed and tinned on the back, or it may be electro-tinned before its removal from the model. Lead or other suitable substance is then poured on the back of the mould to make it "level." Moulds for casting in glass may be made by metallizing a cut and polished article of glass and depositing on it.

3rd. The "application of voltaic electricity for the purpose of " making patterns or moulds for ironfounders in copper." For this purpose a cast is taken from an original pattern—if non-conductable, metallized—and electrotyped in copper. To obtain uniform thickness, the surface to be deposited on should be placed horizontal, opposite to the dissolving plate which lies at the bottom of the depositing vessel.

4th. The "use of bromine and iodine combined with gold, in " conjunction with voltaic electricity, for the purposes above

"enumerated." Gold is dissolved in bromine, either by adding gold leaf, or by the help of alcohol, acetic acid, and sulphuric acid in certain proportions; the gold plate being attached to the "pla-"tinum end of a galvanic battery." This solution is used slightly diluted. When a thick deposit of gold is required, "an am-"moniacal salt" is added to the solution of gold; an alkaline carbonate is added, when the metal to be gilt reduces the gold by immersion. The solution of iodide of gold in "acetate or muriate "of ammonia," or in "prussiate of potassa," may be used instead of the bromine solution. "A device or embossment" may be formed in gold by using "a reverse of the design" electrotyped by the above solution.

5th. "The use of bromine and iodine combined with silver, and "in conjunction with voltaic electricity," for the purposes above enumerated. For an electro-depositing solution, silver is dissolved in acetate of ammonia, proceeding as with gold, or in bromine and alcohol by electricity; the solution is suffered to rest "until "a yellowish white precipitate takes place," which is dissolved in acetate of ammonia by boiling. Other ammoniacal salts or "prus-"siate of potassa" may be used; or a solution may be formed by dissolving an iodide of silver in "prussiate of potassa" or any of the ammoniacal salts.

6th. Methods of electro-coating metallic surfaces with platinum. To prepare the solution, the "platino-bichloride of ammonia" is added to weak hydrochloric acid, and boiled, or platinum is dissolved by electricity in "muriate of ammonia;" or when bromine is used, spongy platinum is dissolved in a mixture of alcohol and bromine, and dilute sulphuric acid added; or the "platino-bichloride of ammonia" may be combined with the alcoholic solution of bromine. Lead may be coated by either of these solutions, and used as the negative plate of a galvanic battery.

7th. "Covering metallic surfaces with tin." The solution used for electro-tinning is of "acetate of ammonia or muriate of that "salt or suphate" [sulphate?] "of soda;" this is used in the ordinary manner.

8th. Methods of cleaning the surfaces of iron that are to be electro-coated with copper, and of electro-coating those surfaces. The iron is attached to the "platinum end of a voltaic battery," and immersed opposite to another iron surface, connected with

the "zinc end," in a solution of sulphate of soda, or malleable iron may be cleaned by immersion in a solution of sulphate of zinc containing a very small quantity of any salt of copper. The iron is then to be electro-coated with copper by proper contact with a suitable galvanic battery, and immersion in a solution of "the "acetate, sulphate, nitrate, or the ammonia acetate" [ammonio-acetate?] "of copper."

9th. A "method of producing embossed or enriched surfaces" on picture frames, &c. by the use of embossed calico, &c.

10th. The "application of caoutchouc" to improve "the texture "of composition used to cast ornaments" for picture frames, &c.

[Printed, 8*d*. See Repertory of Arts, vol. 16 (*new series*), p. 287; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 166; Mechanics' Magazine, vol. 35, p. 282; and Inventors' Advocate, vol. 5, p. 180.]

A.D. 1841, March 29.—N° 8905.

PARKES, ALEXANDER.—"Certain improvements in the production of works of art in metal by electric deposition."

These relate "to the manufacture of works of art of silver and of "gold, by causing these metals to be deposited by electric agency in "or on suitable moulds or models," "in place of producing such "articles by casting, or by pressure, or hammering, or stamping in "dies or shapes." Under the heads of "internal" and "external" moulds, the Specification and Drawings describe various methods of making moulds from other moulds, models, or patterns, to electro-deposit gold or silver in or on, which moulds may be removed by heat or otherwise; a method of making the said moulds by electro-deposition; various means of making the moulds, such as employing wax, stearine, and fusible or other metal, so that they may be removed from the deposit "by heat or solution;" making the moulds or models up of parts, so that they may serve for many copies of the deposited article, or to enable the moulds to be "highly finished," or "internal" moulds to be obtained in one piece from "external" patterns in parts; and a "mode of "strengthening articles of gold and silver produced in or on "moulds by electric depositions, by introducing a baser metal "within them," either electro-deposited or by fusion. In an "internal" mould the face or pattern of the article is against the mould, and in an "external" mould the face is away from the mould, the mould merely imparting form by the equality of the

thickness of the deposit. Details respecting solutions, fusible metal, coating and preparing non-metallic moulds, removal of moulds, battery, &c., are given.

[Printed, 7*d*. See Repertory of Arts, vol 17 (*new series*), p. 199; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 171; Mechanics' Magazine, vol. 35, p. 315; and Inventors' Advocate, vol. 5, p. 227.]

A.D. 1841, April 27.—N° 8937.

PETRIE, WILLIAM.—"The application of the deflective action "which exists between electric currents and magnets for the pur-"pose of obtaining a moving power."

The Specification and Drawings describe and show an electro-motive engine in which "two rectangular helices" (one including the other) cross each other at right angles, and "are fixed in a suitable frame "work;" an axis, in proper bearings, passes freely through one side of the helices, and "on that part of the axis within the helices are "placed magnets with similar poles adjacent;" these may either be electro-magnets or permanent magnets. A "current-changer" attached to the axis enables the electric current to traverse one helix, then the other, then again the first helix in the opposite direction, then the second helix in the opposite direction, and so on; thus producing a constant tendency of the magnets to deflect in the same direction, from each of the coils respectively, and giving, therefore, a rotary motion to the magnet's axis. A description of a "spark-preventer" is also given, in which a "bridge" on the "current changer," "attached to a spring," is made to complete a "short circuit" between the poles of the battery during the changing of the current from one helix to the other, thus avoiding the disruptive discharge; two "bridges" are necessary, one for each helix. Another "spark-preventer" is also described, in which an additional "inlaid strip" on the "current-changer," connected with one pole of the battery, is brought into connection with the other pole by one of the conductors proceeding to the helices, during the change of current. Remarks are made respecting the construction and working of the engine, and the proportion of magnets and helices to battery power is minutely given.

[Printed, 7*d*. See Mechanics' Magazine, vol. 35, p. 382; and Inventors' Advocate, vol. 5, p. 293.]

A.D. 1841, May 14.—N° 8958.

PINKUS, Henry.—"An improved method or methods of "applying electrical currents or electricity, either frictional, "atmospheric, voltaic, or electro-magnetic." This invention relates to:—

The propulsion of "vessels at sea." Galvanic batteries are arranged on the external and internal sides of the ship, insulated from the vessel and from the sea by "a surface of pitched or resend felt," also "auxilliary" troughs are used. "The electro-magnetic engine of contact" (See N° 8644) by this means gives motion to the paddle wheels. To supply and circulate the sea water or other solution through the battery cells, and to assist in propelling the vessel, engines are erected in the ship, with "piston cylinders arranged with clack valves as blast cylinders "for the compression or rarification of air, or arranged for forcing "other fluids or water," worked by means of levers, connected to shafts proceeding through stuffing-boxes to the outside of the vessel, the levers having floats, which move up and down according to the combined motions of the sea and the vessel. This "supply engine" compresses the air into reservoirs, and thus works an "auxilliary" engine connected to the paddle shaft; by means of pumps in connection with the tanks it also causes circulation through the battery cells. The "supply engine" may also have the bottoms of its cylinders open to the sea, its pistons will then be moved up and down at each motion of the vessel over the waves.

The application of the above electro-magnetic engine to canal propulsion. A "locomotive impelling engine" is mounted on a "suspension rail," and has toothed spur gearing working into a rack on the side of the rail, also horizontal guide wheels running on side rails; this engine is moved, either "by the electro-magnetic "engine on the locomotive," or from the vessel by a cord passing round suitable pullies, in the latter case, "a distending rod," capable of adjustment by nuts, and right and left handed screws, *joins the* centres of the pulleys; "the metalic circuits must be "*formed*" as described in N° 8644.

Sealing and unsealing the "pneumatic valve," described in N° 8644. "Metalic circuits" are connected "with the valve "mains, and so render" "soft iron bars," "magnets to hold

"down the flexible valve," by means of soft iron attached to its lips.

[Printed, 3s. 6d. See Mechanics' Magazine, vol. 35, p. 399; and Inventors' Advocate, vol. 5, p. 326.]

A.D. 1841, June 12.—N° 8987.

PALMER, Edward.—"Improvements in producing printing "surfaces and printing china, pottery ware, music, maps, and "portraits." These relate:—

1st. To a mode of drawing and painting on a conducting surface, or on a surface afterwards made conducting, so that metallic plates, with sunken surfaces, can be obtained from them by the electrotype process, from which prints may be taken as from copper or steel plates. The drawing is made on a "whitened" plate with a dark composition (which is described, and the "handling" of it elucidated), the plate is then made conducting with plumbago (for instance), and electrotyped.

2nd. To a mode of drawing on the above mentioned surfaces, so that metallic plates with raised surfaces, as in wood blocks, may be obtained for printing. The drawing is made on a "darkened" plate with a white composition (which is described, and the "handling" of it elucidated), the surface is then made conducting, and electrotyped. A method of "lowering the light parts" is given, which consists in pressing the original plate between millboard, thickened and cut out in appropriate places by a method described.

[Printed, 4d. See Repertory of Arts, vol. 17 (*new series*), p. 101; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 172; and Mechanics' Magazine, vol. 36, p. 28.]

A.D. 1841, July 7.—N° 9018.

MALLET, Robert.—"Certain improvements in protecting cast "and wrought iron, and steel, and other metals from corrosion "and oxidation, and in preventing the fouling of iron ships or "ships sheathed with iron, or other ships, or iron buoys, in fresh "or sea water."

The Specification, amongst other things, mentions the electro-chemical protection of ships "by the contact of zinc according to "the plan suggested by Sir Humphry Davy."

The improvements consist of:—

A mode of cleansing metals before alloying or coating them with other metals.

A method of preserving iron by means of a triple alloy.

The use of a varnish, particularly described in the Specification, and all analogous compounds, "for the purpose of protecting "iron or other metals from corrosion when employed in com-"bination with a coating of the triple alloy" above alluded to, "or when used in combination with a covering of zinc, lead, or "tin, or any mixture of these metals."

The use of a "zoofagous," or animal-and-vegetable-life-destroying paint (composed of "drying linseed oil," red lead, sulphate of barytes, turpentine, "oxychloride of copper," hard yellow soap, common rosin, and a little water) particularly described in the Specification, or of any other paint possessing similar properties, either in combination with the triple alloy and varnish above alluded to, or with one of them, or separately, to prevent the fouling of ships, &c.

The application of the zoofagous paint to ships, &c. "sheathed "with copper and electro-chemically protected by the contact of "zinc, according to the plan suggested by Sir Humphry Davy."

The application of the triple alloy, the varnish, and paint to iron or steel articles, and to ships, "whether all three or any two of "them are used in combination, or they are used separately."

The application of palladium for the purpose of protecting iron or steel.

[Printed, 5d. See Repertory of Arts, vol. 1 (*enlarged series*), p. 284.]

A.D. 1841, July 7.—N° 9022.

WHEATSTONE, Charles.—"Improvements in producing, "regulating, and applying electric currents," relating to:—

1st. "The production of electric currents by means of magneto-"electric machines." A magneto-electric machine is described and shown, in which five pairs of coils, fixed on the same axis, revolve between the dissimilar poles of six permanent horseshoe magnets, the axis passing between the poles of the magnets. The coils are fixed in different relative positions, so that "the "*current* in any one coil" commences "before the currents in "*the other* coils have ceased." The terminal wires of each coil are connected to insulated semicircular pieces of metal, inlaid in the axis, and springs always press upon these; by which arrangement an electric current always passes through the springs in the same direction. A proper metallic connexion is made between

the springs, so as to conduct the nearly continuous current thus produced to suitable binding screws.

2nd. "A means of regulating an electric current by varying "the length of the circuit." First method:—A "slide," connected with one circuit wire, includes in the circuit more or less of a wire wound round a wooden cylinder, according to its position by the turning of the cylinder. Second method:—A flexible wire is wound from a wooden to a brass cylinder, or *vice versâ;* the brass cylinder being connected with one circuit wire; the wooden cylinder carries the wire included in the circuit. Third method:—A wire is bent backwards and forwards on the surface of a fixed wooden cylinder, parallel to its axis; the amount in the circuit depending on the position of a spring, moving, from the centre, over studs terminating each double length of wire.

3rd. "A new method of constructing electro-magnets." Insulated copper ribbon is coiled in concentric grooves cut in the face of a soft iron disc, the grooves communicating by a notch.

4th. "New means of arranging the parts of an electro-magnetic "engine." Horseshoe electro-magnets are fixed in the circumference of a circle and a soft iron ring or armature rolls over them; the armature being excentric to the magnets gives motion to an axis fixed in their centre. Another method:—The axis of a soft iron disc or armature is inclined "to the axis of the circle of "the fixed electro-magnets" and works in sockets in the driving shaft at one end, and in a crank attached to the driving shaft at the other end; the axis of the disc "describes the surface of a "cone," and the disc, by rolling over the fixed electro-magnets, gives motion to the driving shaft. The following are modifications of the application of the principle of giving a rolling motion to an armature in an electro-magnetic engine:—The armature may roll over other lines besides a circle; a reciprocating motion may be given by the armatures rolling over the electro-magnets in a straight line backwards and forwards; either electro-magnets or armatures may move; both may be electro-magnets; and, separate armatures may be used.

5th. "A new mode of combining the parts of an electro-"magnetic engine." The driving shaft carries horseshoe permanent magnets (their poles radiating outwards and disposed alternately) in front of a fixed circular frame supporting electro-magnets at right angles to the permanent magnets, and with their

similar poles opposed. By interrupting and reversing the current by means of an inlaid disc alternately connected, called a "rheotrope," motion of the driving shaft is obtained. The coils of the electro-magnets form a continuous single circuit. The following modifications are stated :—Coils may be used instead of electro-magnets; the electro-magnets or coils may be lengthened in the radial direction; electro-magnets may be used instead of permanent magnets; the electric current may pass through all the coils simultaneously; magnetic bars may be used, with similar poles outwards, instead of horseshoe magnets, the coils being then wound in the same direction and the current merely being interrupted; also, any number of circles of magnetic bars and electro-magnets or coils may be used on the same axis; by this means both sides of the magnets and coils (except the exterior ones) are used.

6th. Releasing the "detent" of a clockwork by means of an electro-magnet, thus causing a hammer to impress characters upon a surface. The application of this invention "to the electro-" magnetic telegraph," described in the Specification of Patent N° 8345, is set forth. "Two independent movements" are employed; one to bring "any required stamp to the proper " position," (similar to the mechanism described in N° 8345, except that "steel punches," at the extremity of separate radiating springs, are substituted for the "paper disc"); another to move " the cylinder so that the type may be opposite to a fresh place," and to cause "the hammer to strike upon it when placed there." The detent has a piece of soft iron at its upper end and is released from "the quickest wheel" "of the train" by the electro-magnet when the current passes, but has a "projection bearing " against" a "slower wheel" that prevents the detent returning until its revolution. A "pin" is fixed on the slower wheel, which, by striking against a ratchet wheel and lever, puts in motion respectively the cylinder and the hammer to strike the punch. The cylinder may be moved helically by being rotated on an axis moving on a fixed screw; or a platform moved by a rack and pinion may be used. Alternate layers of white and blackened paper are employed to receive the impressions of the punch.

7th. Obtaining "any determined succession of independent and " dissimilar actions," by means of a single electric circuit acting successively on electro-magnets through an inlaid disc. The

application of this apparatus to telegraphic printing is set forth. By means of a spring rotating by clockwork over an ivory "disc," inlaid with metal pieces in connection with separate electro-magnets and mechanical movements the clockwork is released, the type-wheel moved, the cylinder advanced, and the blow of the hammer struck; the spring then comes again to its first position; one end of the circuit wire is connected with the rotating spring, the other with the remaining ends of the wires of the electro-magnets.

8th. Recording the time at which distant actions take place. A surface carrying paper, ruled to represent equal intervals of time, is made to move uniformly by clockwork; and an electro-magnet, included in the circuit, has a lever armature carrying a pencil, which is depressed, and marks the paper whenever the circuit is completed.

[Printed, 2*s*. 2*d*.]

A.D. 1841, August 21.—N° 9053.

DE MOLEYNS, Frederick.—"Certain improvements in the "production or developement of electricity, and the application "of electricity for the attainment of illumination and motion;" relating to:—

1st. A galvanic battery, composed of a mixture of a solution of nitrate of ammonia and sulphuric acid in contact with a "platina" plate, and muriate of ammonia in contact with an unamalgamated zinc plate; a sycamore porous cell divides the fluids.

2nd. A means of generating the electric light, by constantly supplying the electrodes at their junction, with "pulverized charcoal" from a tube in which the upper electrode is enclosed: the electrodes consist of two coils of platinum wire of suitable thickness, the lower one enclosing a piece of spongy platinum. The whole arrangement is enclosed in an exhausted glass globe.

3rd. Constructing an electro-magnet, by rolling "a strip of "sheet iron" with insulated wires laid upon it "upon a cylin-"drical rod," so that upon its withdrawal the sheet iron and wires may present "a compact electro-magnet, each wire having a sur-"face of iron on both sides;" the hollow portion of the magnet may be filled up with an iron rod.

An electro-magnet is described, consisting of "soft iron hollow

"cylinders," properly covered with insulated wires, introduced into one another, and fastened "by a screw."

The above or any other electro-magnets are applied to electro-motion by fixing them on the rim and spokes of "a wooden "wheel," "parallel to its axis;" similar electro-magnets are fixed so that their poles "are opposed" to the poles of those on the wheel; the motion of the wheel is produced by "a change in the "polarities of the fixed magnets effected by a commutator worked "by the wheel."

[Printed, 7d. See Mechanics' Magazine, vol. 36, p. 236.]

A.D. 1841, September 8.—N° 9077.

BARRATT, OGLETHORPE WAKELIN.—"Certain improvements "in the precipitation or deposition of metals," consisting of:—

1st. "The application of electric currents for the purpose of "depositing copper and its alloys taken into solution in the acids "employed during the process of cleaning such metals." "A satu-"rated solution of copper" is made in dilute "dipping aquefortis.' The work to be cleaned is placed in this solution in connection with the wire from the negative battery plate, and plates of copper are connected with the positive battery plate. If the articles to be cleaned are required bright, "free acid" is added; but if they are required dead, "muriatic acid" is added.

2nd. A mode of electro-depositing zinc "upon other metals." The articles to be coated are placed in a solution of zinc "in diluted "sulphuric acid cold" in connection with the positive battery plate, a plate of zinc being attached to the negative battery plate. If amalgamated zinc is used in the battery the zinc plates in the depositing liquid may be slightly amalgamated, otherwise they are not amalgamated. Other solutions of zinc may be used.

3rd. Two methods of electro-coppering iron and other metals.

First, the articles to be coated are connected with a zinc plate wrapped in cloth, and the whole is immersed in an acid solution of sulphate of copper.

Second, a solution of sulphate or "cyanuret" of copper is made in "cyanuret of potassium" by boiling. The articles are then immersed in this solution proper battery connections being made with them and with copper plates in the solution. Other compounds of potassium or sodium may be used. If a brass surface is desired,

zinc is electro-deposited on the copper surface, and a heat of 300° Fahrenheit is applied "in a muffle."

4th. Modes of depositing platinum from its solutions "as a "covering to other metals." The article is connected to a zinc plate and the whole immersed in an acid solution of platinum. Another process is to dissolve platinum in certain proportions of muriate of soda, alum, cream of tartar, and water; this solution may be used with or without the battery. Palladium may "be employed "in like manner."

5th. Electro-depositing copper from mineral waters. A porous earthenware vessel is placed in a pit containing the cupreous solution and filled with a solution of muriate of soda. Iron is then placed in the porous vessel and connected with the sheets of metal intended to receive the deposit of copper.

6th. Gilding, silvering, or platinating. The metallic sulphuret is dissolved by boiling in hydrate of potash. These solutions may be used with or without a battery.

7th. Electro-depositing alloys of metals. The sulphurets of the metals forming the alloy, in the proportions requisite to make the alloy, are dissolved in "cyanuret of potassium." An "alloyed "anode" of "the proportions contained in the solution" is employed "when using a galvanic or other battery."

[Printed, 4d. See Repertory of Arts, vol. 17 (*new series*), p. 367; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 438; and Mechanics' Magazine, vol. 36, p. 476.]

A.D. 1841, December 9.—N° 9167.

TALBOT, William Henry Fox.—"Improvements in coating "or covering metals with other metals, and in coloring metallic "surfaces," consisting of:—

1st. "Adding gallic acid to the metallic solution intended to "be precipitated." "A clean bright plate of metal" is immersed in "any convenient solution of silver, gold, or platina," to which an alcoholic solution of gallic acid has been added.

2nd. "A method of silvering metallic surfaces." "A clean "bright plate of metal" is immersed in a solution of "freshly "precipitated chloride of silver in hyposulphite of soda, or any "other liquid hyposulphite."

In either the 1st or 2nd process, a galvanic battery may be employed "to obtain thicker coats of metal;" "brass, copper,

" silver, German silver, and also (though less effectually), iron and " steel" may thus be coated.

3rd. " Ornamenting surfaces of brass or copper, by first gilding " them partially according to some pattern, and then washing " them over with a solution of chloride of platina," which " gives " a dead black appearance" to the parts not gilt.

4th. " A method of coloring polished surfaces of copper by " exposing them to the vapour of sulphuretted hydrogen, or of " any of the liquid hydro-sulphurets, or to the vapours of sulpher, " iodine, bromine, or chlorine, or by dipping the metal into liquids " containing them." Effective ornamental patterns may thus be produced, and " as it is easy to render the copper nearly white" by this method, it may be employed " for obtaining metallic " specula or mirrors as follows:"—An electrotype cast from a polished surface is exposed " to the action of the vapours," " until " it is sufficiently whitened;" the surface thus obtained is not liable to tarnish by exposure to the atmosphere.

[Printed, 3*d*. See Repertory of Arts, vol. 1 (*enlarged series*), p. 47; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 357; Mechanics' Magazine, vol. 36, p. 496; and Engineers' and Architects' Journal, vol. 5, p. 358.]

A.D. 1841, December 21.—N° 9204.

WRIGHT, THOMAS, and BAIN, ALEXANDER.—" Improvements " in applying electricity to control railway engines and carriages, " to mark time, to give signals, and print intelligence at distant " places," relating to :—

Controlling railway engines and carriages. " The deflection of " the electric conductor, or a coil of wire," moves a dial hand, and releases a " stop," thus liberating wheelwork. A weight at the end of a lever acts on the stop disc through a rack head, pinion, ratchet wheel, and spur gearing. A stud on the lever is linked to the throttle valve lever and steam whistle, both of which are acted on when the stop is released, and the weight thus permitted to descend. " A pilot engine" with a " governor," propelled by the driving wheel axle, about a mile in advance, is used in connection with the above apparatus; the electric current from a battery on the locomotive passes through " brackets" and spring " plugs" to long conducting wires laid on the line of railway, thence through the governor rod to a coil of wire, and back to the battery through the line wires; as long as the current circulates through the coil,

the "stop" prevents the clockwork from acting, but when the governor balls fall, a spring in the circuit presses against a piece of ivory on the governor rod, thus interrupting the circuit, and putting the mechanism into action.

"An electro-magnetic printing telegraph." Electro-magnets are arranged in the circumference of a circle, each having a "feeder" or armature fixed to a spindle, which is attached by means of a pin to the tail of the "type lever;" the type levers (mounted between "cocks") being all made to strike the paper and a blackened ribbon at the common centre of the magnets. There is also a central magnet that draws down the soft iron type lever heads when they get sufficiently near, and another to move the paper forwards, through both of which the current passes whenever the circuit is completed. The surface of the ribbon is rubbed over with a composition of oil, lamp-black, and spirits of turpentine; and the magnet that moves the paper forward has a "feeder" or armature connected with a lever and click working into a click wheel on the shaft of the paper roller.

A method of printing and giving signals; in which a spring barrel rotates the type wheel, and brings the corresponding letter to the aperture in the dial by means of a coil acting on a ratchet wheel by pallets; a second spring barrel brings the type to the paper, and moves the paper by means of a governor (rotated by the first spring barrel, and mounted on a "friction collet"), which allows an excentric, and ratchet-wheel to act as soon as the coil has brought the desired type opposite the paper; for this purpose the governor lever bears against knees suitably fixed on the shaft of the excentric. The coil is only deflected when the circuit is completed.

An instrument to show whether a telegraph is indicating or printing correctly at a distant station. On the completion of the circuit, the battery current rotates a hand round a disc at the distant station, by the deflection of a coil from a permanent magnet acting on the spindle of the hand through a ratchet wheel and click movement. At certain positions of the hand, a battery at the distant station is brought into action by studs, over which an insulated metal curve on the hand passes; this battery deflects a small coil at the telegraphing station, the current being at such times insulated from the instruments, by a spring in the circuit pressing against a non-conducting portion of the ratchet wheel. At the

telegraphing station a steel disc is used, with ivory studs inserted, which cut off the main circuit at each deflection of the needle. This instrument is employed to work the last-mentioned telegraphic printing apparatus.

The application of the deflection of a coil to the movement of timepieces. An electric current is sent through a coil every minute, by means of a pendulum or balance-wheel; every deflection of the coil moves a ratchet wheel forward one tooth by a click on the coil; this motion is communicated to the hands by the ordinary clock-mechanism. Two coils working two ratchet wheels may be used instead of one in any of the above applications, one coil working at a time by the reversal of the current.

"Laying down the conducting wires for telegraphic purposes in "asphalt, pitch or any other cement," "by digging a trench," and filling it to a small depth "with the cement in a soft state. "When this is hardened," the wires are laid on it, and another quantity of cement in a soft state is run in the trench, and on and over the wires.

Using "bodies of natural waters" to complete the electric circuit, by laying a single insulated wire between the given stations, having at each end a metallic brush immersed in the water.

[Printed, 2s. 5d. See Mechanics' Magazine, vol. 36, p. 97.]

A.D. 1842, January 15.—N° 9227.

PALMER, Edward.—"Improvements in producing printing and "embossing surfaces," consisting of:—

1st. "A mode of obtaining surfaces for relief printing by means "of the electrotype process or by casting." A smooth plate of German silver or brass, blackened on the surface, either by means of a solution of chloride of platinum or of "hydrosulphuret of "ammonia," is coated with a composition of "the clear part of "Burgundy pitch," rosin, white wax, and spermaceti, and its surface whitened with finely powdered sulphate of lead; lines etched upon this surface appear dark upon a white ground. The whole plate is then electrotyped, being placed in the solution before the ground is made conducting; the ground is then plumbagoed, and the electrotype proceeded with. Or a plaster cast may be taken of the subject, from which a reverse cast for stereotyping may be had by rubbing the first with lather of soap and taking a plaster cast in the usual manner.

2nd. A mode of obtaining metallic printing surfaces with the design sunken. Drawings made upon prepared surfaces are electrotyped or cast in wax, from which electrotype or casting "as "many printing copies as required can be taken." To make the prepared surface, a very thin coating of a mixture of white wax and sulphate of lead is poured over a metal plate and a border made round it when cold; a sufficient quantity of white wax mixed with plumbago is poured on this and the tablet is taken off the plate ready for use; the design drawn on this surface appears black upon a white ground. Or a cast from an oiled polished piece of metal or glass is taken in plaster of Paris, and the design drawn on it with a black-lead pencil, then etched with an engraver's needle; while working, finely-powdered charcoal is dusted into the lines; this method is preferred.

3rd. A mode of obtaining, by the electrotype or stereotype, blocks for surface printing from engraved plates. Printers' ink, mixed with driers or Brunswick black, is spread carefully over the engraved plate, so as not to fill up the engraved lines, by means of a printer's composition roller; oxide of iron mixed with litharge, in fine powder, is sifted over this, the whole dried, and the powder brushed off. This process is repeated until a sufficient thickness is obtained, and the whole is black-leaded and electrotyped, or cast from in plaster.

4th. "Obtaining embossing surfaces" by "sinking the subject "in a prepared surface of plaster of Paris" (see 2nd improvement), "and then, by obtaining a cast therefrom," producing "an "embossing surface by the electrotype or by casting." If the surface is to be obtained by the electrotype, a wax mould of the plaster must be taken, but if by stereotype, a plaster mould.

[Printed, 4*d*. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 279.]

A.D. 1842, June 1.—N° 9374.

LEESON, Henry Beaumont.—"Improvements in the art of "depositing and manufacturing metals and metal articles by "electro-galvanic agency, and in the apparatus connected there-"with," consisting of:—

1st. A galvanic battery; in which the trough contains two removeable frames—one, resting on the bottom of the trough, and containing porous cells and partitions—the other, resting on the

top of the trough, and containing the metal plates. The porous cell frame is not wanted when only a single fluid is used. The plates are secured to "bars," projecting inwards from the side of the frame, with screw clamps, in such a manner as to be removeable singly without disturbing the others. A voltameter is described and shown, that has great area of acting surface supported in a glass vessel from a metal cover.

2nd. Cleaning zinc and copper battery plates by electricity; by first removing the impurities by immersion in an acid or saline solution, in connection with the positive pole of a battery, and then (in regard to the copper plates only) electro-depositing copper on them. Also, amalgamating zinc plates by the electro-deposition of mercury on them.

3rd. Battery exciting fluids to be used in connection with sulphuric, nitric, or muriatic acids. Ammoniacal liquor from gas works, lime liquor after use in gas purifying, alkaline sulphurets the residuum of the "processes for making potash and soda," the sulphates of calcium, barium, and strontium, the alkalies and their carbonates, and "the acid solution of sulphate of iron" produced "in the manufacture of green copperas or sulphate of iron, in con- "nection with any of the last-mentioned alkaline solutions or "sulphurets."

4th. Adjusting or diminishing the "quantitative" or electrolytical effect of a battery, by increasing the number of pairs, there being not less than ten pairs used.

5th. Using glue, either alone or together with gums, resins, or a solution of tannin, to make elastic moulds for wax electrotype casts; and a strong solution of cyanide of silver and potassium to deposit upon the casts. To projecting parts a pin of metal is attached which receives the rough deposit that would otherwise take place on the mould; the pin is afterwards cut off. Positive wires are led into cavities or undercut portions to cause an equable deposit, and conducting wires are inserted into wax moulds to facilitate deposition.

6th. Giving motion to the article to be deposited upon (not on its own axis), by means of a roasting jack, &c.; or the depositing solution may be agitated.

7th. Forming parabolic and other reflectors by first electro-depositing the silver or other face, and then a suitable thickness of copper; the face is then highly polished.

8th. Electro-depositing alloys. First method:—By using a solution composed of similar salts of the different metals, and as many distinct galvanic batteries as metals, all the negative poles being connected to the article to be coated, and each metal to a positive pole. Second method:—A beam, moved by any suitable power, alternates the battery connection with the metals; one or two batteries may be used. Third method:—One battery may be used, and a dissolving plate of each of the metals. Fourth method:—" Any of the non-metallic electrotytic" [electrolytic?] " fluids," described in the 11th improvement, may be used "in " connection with any of the herein-before recited arrangements."

9th. Giving a coating of mercury by immersion to prepare metallic surfaces for electro-deposition.

10th. Arranging the articles to be coated, themselves, "in series " as a portion of the battery," so as to assist in generating and " maintaining the galvanic current."

11th. Electro-depositing metals "by the aid of electrolytic solu- " tions not originally containing such metals;" proto-salts and " those that form double salts with the metal" are preferred, and the electric current must be intense enough.

12th. Manufacturing platinum and other metals from their ores by electro-deposition. The solutions named in the 11th improvement are, by preference, used. The metal may at once be deposited in the required form.

13th. Manufacturing platinum vessels, &c. by electro-depositing the metal upon a suitable mould, which is afterwards removed; a platinum cathode is used. In electro-coating articles with platinum, they are previously plumbagoed or coppered.

14th. The application of certain compounds of the metals, not before used, to furnish an electrolytic solution for their deposition. " Sulphate of silver" is mentioned twice, and "sulphate of silver " and soda," "sulphate of silver and potassa," "hypo-sulphate of " silver and strontia," "racinate of silver," and "sulphorinate of " silver," are also mentioned; these are referred to in the "Me- " morandum of Alteration." Under this head, about 430 compounds of the metals not before used, are mentioned in the list.

A "Memorandum of Alteration" was enrolled by the Patentee, March 25, 1843, in which the sentences,—"sulphate of silver," " sulphate of silver and soda," " sulphate of silver and potassa,"

" hyposulphate of silver and strontia," "racinate of silver," and " sulphorinate of silver," occurring in the Specification,—are altered into "sulphite of silver," "sulphite of silver and soda," " sulphite of silver and potassa," "hyposulphite of silver and " strontia," "racemate of silver," and "sulphovinate of silver," respectively.

[Printed, 2s. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 292; Mechanics' Magazine, vol. 38, p. 59; and Record of Patent Inventions, vol. 1, p. 353.]

A.D. 1842, June 4.—N° 9379.

TUCK, EDMUND.—" Covering or plating with silver various " metals and metallic alloys."

This invention " consists in the use of either of the two carbon- " ates of ammonia, namely, the sesquicarbonate and the bicar- " bonate as one of the ingredients in the mixtures or compounds " employed for covering or plating with silver various metals and " metallic alloys by the action of electricity." A process is described for plating " bad German silver," in which "sulphate of " silver" is used in combination with "a solution of bicarbonate " of ammonia" in "equivalent" proportions; for plating "on " copper or on good German silver," "cyanide of silver" in " equivalent" proportions is used instead of "sulphate of silver." The inventor prefers to use a modification of " Daniell's constant " battery," which is described, as a suitable source of electricity for electroplating by these solutions. The arrangement of the trough for plating, the method of cleaning the metal alloy to be plated, and the regulation of battery power to the article to be coated, is set forth.

[Printed, 4d. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 458; and Record of Patent Inventions, vol. 1, p. 373.]

A.D. 1842, August 1.—N° 9431.

WOOLRICH, JOHN STEPHEN.—" Improvements in coating " with metal the surface of articles formed of metal or metallic " alloys."

A magneto-electric machine is described and shown, consisting of a horseshoe-formed armature, revolving in front of a fixed horseshoe permanent magnet. The permanent magnet is adjustable to any required distance from the armature by means of a

screw, and the electric currents are made to flow in one direction by means of a "dividor," which consists of a non-conducting collar fitted on to a brass tube fixed centrically to the armatures; one of the terminal wires is in connection with a brass semicircle on the collar, the other terminal wire is in connection with an opposite brass semicircle; two pairs of springs (fixed to the frame of the instrument by pillars containing binding screws), press alternately on the brass semicircles, one spring of each pair being on the wooden collar when the other is in contact with a brass semicircle, thus enabling each pair of springs to become a pole of the instrument, and a nearly continuous current of electricity to flow through the circuit when closed.

Silvering, gilding, and coppering solutions, to be used in connection with the above magneto-electric machine, are described. The silvering solution consists of sulphite of silver (precipitated from the nitrate by sulphite of potash) dissolved in sulphite of potash, of which an excess is added. The gilding solution consists of oxide of gold (precipitated from a chloride by magnesia) dissolved in sulphite of potash, of which an excess is added. The coppering solution consists of carbonate of copper (precipitated from the sulphate by "carbonate of potassa") dissolved in sulphite of potash, of which an excess is added. The solvent solution above-mentioned (sulphite of potash) is made by passing sulphurous acid gas through a solution of pearlash, "taking care " not to add sulphurous acid gas in excess."

[Printed, 10*d*. See Repertory of Arts, vol. 1 (*enlarged series*), p. 210; London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 460; and Mechanics' Magazine, vol. 38, p. 145.]

A.D. 1842, September 8.—N° 9465.

COOKE, William Fothergill.—This invention "relates to " the arrangement and disposition" of telegraph wires. The improvements consist of:—

Stretching, suspending, and insulating telegraph wires on posts and other suitable supports entirely of wood, or of wood and iron, erected at suitable distances. If the wires are required at an unusual height above the level of the ground, one pole is applied at the top of another in the manner top-masts of ships are placed on the lower masts, and they are properly stayed. To carry the wires beneath an arch, a piece or pieces of wood in an inclined position

are used. The wires may either be placed one over the other, at one or both sides of the post, or on horizontal cross pieces fixed to one or more posts or supports. When the posts are necessarily at great distances apart, the wires may be kept at the required distance by glass tubes lashed to a bamboo rod. This improvement may be used alone or in conjunction with the methods of mounting and insulating telegraph wires set forth in Letters Patent, Nos 7390 and 7614.

At certain distances stronger posts are erected, to stretch the wires so that they may hang parallel to each other. The following methods of straining the wires may be used:—"Winding up "spindles with ratchet wheels and clicks," either fixed or removeable after the stretching; screw bolts and nuts with eyes to receive the wire; or "tackles or pullies in conjunction with holding "tongs," or a bent lever in conjunction with a bolt having pin holes and an eye, may be temporarily applied; metallic contact between the wires, being made through a piece of metal on which the ratchet wheels and clicks are mounted, or through which the bolts are fixed; or a copper wire may make metallic contact between the telegraph wires. Each drawing-post may have stretching apparatus on one or both sides. When branch wires are required, the suspending or winding up apparatus on the nearest post must be mounted separately for each wire, so that the circuit is only completed through the signal apparatus.

The insulation of the wires from the suspending and drawing posts, and from the earth is accomplished by the following means:— The top of the post is enclosed in a wooden, glass, or earthenware case, the wires either being suspended on hooks outside the cases, or the cases having apertures for the wires; sheds may be used, with or without the cases, to "preserve a dry zone" around the posts between the wires, and one larger shed under the wires to keep them insulated from the earth; the wires themselves may be passed through tubes of glazed pottery-ware or glass, or a split goose quill fastened to the wire with white lead and twine; or the wires may be suspended under a shed by india-rubber loops and metallic S hooks; or the suspension hooks may be attached to glass tubes.

The wires used may be either single wires of copper covered or not with thread and varnish, or iron wire painted and varnished; or compound wires of several wires twisted together with a central

yarn of tarred hemp, or a central wire of copper, or a copper wire twisted amongst the iron wires may be used.

The wires so stretched, suspended, and insulated, may be used for one half the telegraphic circuit, in conjunction with the earth circuit for the other half, instead of the "sixth wire" referred to in Letters Patent, N^{os} 7390, 7614, and 8345.

Distinct batteries may be used in conjunction with the suspension of the wires and the earth circuit, one to each wire, thus making as many electric currents available at one time as there are wires.

Communicating, by electric means, between any carriage in a railway train and the engine driver. Conducting wires, composed of two twisted copper wires woven into a web or threadwork, well coated with india-rubber, are extended over the tops of the carriages, and have branch wires proceeding to each carriage connected respectively with springs that can be brought into contact when required, thus actuating a battery and alarum (See Letters Patent, N° 7390) placed in the front carriage. A wooden roller (through whose pivots and standards the proper connections are made) is mounted over the alarum for the purpose of winding up the web.

The above-described improvements may be applied to communicating action from one regulating clock to other clock trains, to ensure their moving uniformly, also to printing telegraphs, and to releasing mechanism by means of electricity.

Constant reference is made, in the Specification, to Letters Patent, N^{os} 7390, 7614, and 8345.

[Printed, 2*s.* 3*d.* See London Journal (*Newton's*), vol. 30 (*conjoined series*), pp. 116 and 201; and Common Bench Reports, vol. 4, p. 462.]

A.D. 1842, November 25.—N° 9528.

TALBOT, WILLIAM HENRY FOX.—"Improvements in coating "or covering metals with other metals," consisting of:—

1st. Preparing metallic surfaces for gilding, by means of a very thin coating of silver, given by immersion in a weak solution of silver in hyposulphite of soda.

2nd. Preparing metallic surfaces for gilding or silvering, by attaching the well-cleaned article "to one of the poles" of a voltaic battery, and plunging both the poles into an acid or saline solution, so as to cause the surface to be gilt to give off hydrogen freely; the article is then "immediately thrown" into a proper

solution of gold or silver and is thereby coated, it is then washed. The process is repeated as often as may be necessary.

3rd. Gilding metallic articles by immersion in a mixed solution containing chloride of gold, mixed with nitrate of lead or hydriodate of zinc. A weak solution of gold is used first, then a strong solution.

4th. "Using a solution of chloride of gold, mixed with a solution "of boracic acid, for the purpose of gilding articles of brass or "other metal."

5th. When metallic articles "acquire a dark tint," by being dipped into a solution of gold, dipping them into a weak solution of nitrate of mercury, then again into a solution of gold, and so on. The excess of mercury may be removed by an acid "assisted "by voltaic action."

6th. Silvering metallic articles by immersion in different solutions, thus making the metal on the surface become dissimilar to that in solution. A different solution of silver, or of some other metal, may be used. A slight coating is given by voltaic action, "and these dippings are then to be repeated alternately." This method applies to gilding also.

"Brass, copper, silver, German silver, iron, and steel" may be coated by the processes described in this Specification.

[Printed, 3d. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 378; Mechanics' Magazine, vol. 39, p. 31; also Engineers' and Architects' Journal, vol. 5, p. 358; and vol. 6, p. 303.]

A.D. 1842, December 28.—N° 9572.

HULL, Alonzo Grandison.—"Improvements in electrical apparatus for medical purposes, and in the application thereof to "the same purposes." The mode in which these improvements are carried into effect is as follows:—

1st. By "making the opposite poles of the electrical circuit of "different sizes for the purpose of regulating the quantity, intensity, or quality of the electrical force."

2nd. By "the introduction of medicine into the electrical "circuit."

3rd. By "insulated conducting wires for passing the electric "current into particular parts of the body."

4th. By "putting particular parts of the body into a positive or "negative state of electricity, in order to stimulate or dissolve or "form it anew."

5th. By "varying the extents of the conducting surfaces, and " quantity of water or other fluid or kind of fluid, or medicine, for " the purpose of modifying the electric current."

6th. By "introducing medicine into the body by means of im- " mersion or partial immersion in a bath acted upon by an electrical " apparatus."

The other points alluded to in the Specification are explanatory of the above, and refer also to varying the "conducting power of " the water or other media in contact with either pole," also to " water or other fluid or medicines or other media," being "the " communicating medium between either one or both of the poles " and the animal body," and to other means of modifying and applying electrical apparatus to medical purposes.

[Printed, 3d. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 401.]

A.D. 1843, February 21.—N° 9641.

BLACKWELL, Benjamin Brunton, and NORRIS, William. —The title of this invention is as follows :—" An improvement in " coating iron nails, screws, nuts, bolts, and other articles made " of iron with other metals;" and the invention relates to coating iron with copper by galvanic agency.

The improvement consists in rendering the iron surface " much " less electro-positive to copper, less liable to oxidation, and in a " better state for receiving a sound, firm, and ductile coating of " copper," either by case-hardening the articles of iron, or by previously coating them with lead or an alloy of lead. The articles may be case-hardened by subjecting them to a red heat in a crucible or iron box, in contact with parings of hoof or horn, or bone dust; the case-hardened surface should be thin, otherwise small articles are liable to be brittle. Articles are coated with lead or its alloys by immersion in the molten metal "in precisely the same " manner as is known and practised for covering iron with tin." The alloys of lead that may be used are—lead and tin—and lead, tin, and antimony. The iron goods may be placed (whilst hot from the preparatory process) in a solution of copper, in the galvanic circuit, the battery being kept at 80 or 100 degrees of Fahrenheit's thermometer.

[Printed, 3d. See Repertory of Arts, vol. 3 (*enlarged series*), p. 363; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 16; and Mechanics' Magazine, vol. 42, p. 108.]

A.D. 1843, April 11.—N° 9693.

NAPIER, JAMES.—"Preparing and treating fabrics made of "fibrous materials," by the electro-deposition of "metal or "metals" upon them, so as to make them applicable to "covering "roofs," "the bottoms of ships," and other useful purposes. The electric current may be "derived from a galvanic battery or "any other source." The invention is described under two heads:—

1st. "The preparation of the fabric so as to give it a con-"ducting surface." Any convenient method may be employed; the following methods are described. The fabric is immersed, and sometimes boiled, in an agitated mixture of plumbago, ground very fine, and water. A pulverized "compound of zinc and iron," mixed with black lead, "is very useful in obtaining a metallic "surface." Or "plates or other convenient pieces of metal" are "closely attached to the opposite side of the fabric." Or the fabric is impregnated "with a salt of copper," and glycerine used to reduce such salt. Or the impregnated fabric is exposed to "a "current of phosphoretted" [phosphuretted?] "hydrogen and "other gases," in a mode described. "Phosphorus dissolved in "sulphuret of carbon," "diluted with turpentine," is a reducing agent to be applied to the impregnated fabric "after having been "first dipped in the solution of phosphorus."

The introduction of "thin metallic wires at intervals into the "fabric," is "a method of producing a stronger bond of union "between the fabric and the metal."

2nd. The mode of electro-depositing "on fibrous materials." In a vessel containing the depositing solution is placed several sheets of iron, covered on one side with a diaphragm of plaster of Paris and Roman cement, and on the other with the fabric to be deposited on; the whole are then connected by suitable wires so as to form "a galvanic series;" a galvanic battery may be interposed between the poles to assist the action. Another mode is, to attach the fabric closely to a plate of metal, so as to surround it; paste may be used for this purpose, and the face of the fabric made well conducting: or the fabric may be pasted on to a plate of amalgamated zinc, and the compound of zinc and iron rubbed upon the surface; this is then "placed in a suitable metallic "solution," connected properly with a galvanic battery, and the electro-deposition conducted in the usual manner. Or the fabric

may be electro-coated in the usual manner, after having its surface made conductable.

[Printed, 7*d.* See Repertory of Arts, vol. 2 (*enlarged series*), p. 335; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 429; Mechanics' Magazine, vol. 39, p. 430; and Engineers' and Architects' Journal, vol. 6, p. 436.]

A.D. 1843, May 25.—N° 9741.

POOLE, Moses (*a communication*).—" Improvements in the de-" position of certain metals, and in apparatus connected there-" with," consisting " in the employment of certain solutions of " gold, silver, and copper," and in the " application of a thermo-" electrical battery or apparatus in connection with the same," or other solutions.

Silver solution is made by dissolving carbonate of silver (precipitated from the nitrate by carbonate of soda) in a solution of hyposulphite of soda or potash and carbonate of soda; hyposulphite of soda or potash, and carbonate of soda, should be added, so that the solution may contain those salts in the free state. Or, the above solution is boiled " for one hour; during which time, a " portion of silver is precipitated and the hyposulphite changes, " forming a new and distinct salt."

Gold solution is made by precipitating " the gold " by " liquor " ammoniac " from a solution of gold in nitro-muriatic acid, evaporated " until it assumes a deep red color," and then diluted: " this precipitate of gold " is dissolved in a solution of " hyposulphite of soda (or potash)" by boiling.

Copper solution is made by dissolving carbonate of copper in a solution of " hyposulphite of soda (or potash)," and carbonate of soda.

The above solutions are used " with currents of electricity."

The " thermo - electrical battery " consists of 100 pairs of German silver and iron rods connected together alternately, and placed (insulated from each other) upright in an iron vessel by means of plaster of Paris or clay, but so that all the soldered parts of the series are uncovered. The upper surface is covered with pitch, and has a current of cold water flowing over it; the iron vessel or " frame " is so placed that the lower ends of the series dip into a sand bath " heated nearly to redness."

A battery of fifty pairs might suffice for small articles.

[Printed, 5*d.* See Repertory of Arts, vol. 3 (*enlarged series*), p. 6; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 14; and Mechanics' Magazine, vol. 40, p. 14.]

A.D. 1843, May 27.—N° 9745.

BAIN, ALEXANDER.—"Certain improvements in producing and "regulating electric currents, and improvements in electric time-"pieces, and in electric printing and signal telegraphs," relating to:—

1st. "The production of electric currents" by means of one or more positive and negative "substances placed in the earth, or in "natural bodies of water," proper insulated metallic connections being used.

2nd. Regulating voltaic currents. By means of a sliding spindle carrying a pin, the keeper of an adjustable electro-magnet, included in the circuit, stops a clock mechanism to which the battery plates are attached as a weight whilst the current is sufficiently strong; but when the current weakens, a spring forces the keeper back, and the plates are let down into the solution. Another arrangement:—The plates merely act as the weight to a clock. A third arrangement:—When the current weakens, solution is admitted to the battery by means of a lever and stopper attached to the keeper of an electro-magnet included in the circuit.

3rd. Improvements applied to time-pieces and printing or signal telegraphs. Various arrangements, on which the improvements depend, are first set forth; they are as follows:—A rectangular coil of insulated wire is suspended, free to vibrate, between the poles of a permanent horseshoe magnet, or of two horseshoe magnets with opposite poles facing each other, the axis of the coil being at right angles to the axes of the magnets; motion of the coil is produced by the reversal of the direction of the electric current. In another pendulum arrangement, the axis of the coil is parallel to the axis of the magnet; in this case similar poles face each other when two magnets are used. In a third pendulum arrangement, the permanent magnet has a central south pole surrounded by a number of north poles; two magnets, with similar poles facing, may be used. In a fourth arrangement, "a permanent magnet, "suspended compas fashion," has two segmental arms free to move through the centres of two coils according to the direction of the electric current; or two semicircular magnets, with similar poles facing, fixed to a brass bar, may be used.

The above arrangements are applied to electric clocks in the

following manner:—Separate pendulums regulate each other by the third arrangement. The coil is mounted on a spring, and has a catch (included in the circuit) which detains each pendulum until the last has completed the circuit, and enabled the coil to enter the hollow magnet. In another application, a pendulum is worked by means of the first arrangement, one wire being attached to the point of suspension, the other to the axis of an arm carrying a ball on the pendulum, which, by falling from side to side during the vibration of the pendulum, completes and breaks the circuit at proper intervals. In a third application, a pendulum, vibrating according to the third arrangement, is used with the arm and ball movement, the coiled pendulum bob being attracted whenever the circuit is completed through the ball, but not otherwise; in this case the vibration of the pendulum works the clock by means of a click spring and click wheel, or it merely works the escapement, as may be required. A method of working a set of clocks without breaking the main circuit, by a branch circuit returning into the main wire, is set forth.

The applications of the electro-magnetic arrangements to printing telegraphs are as follows:—The third arrangement is used to stop governor balls connected with signal and printing apparatus, the current always passing through the coil, except when a signal is made. When the governor balls rotate, they enable one spring barrel to rotate the signal pointer and type wheel, until the hands of both the telegraph instruments (which are alike) point to the desired signal, when another spring barrel is permitted to act on the printing apparatus by means of the governor lever and pallets. The printing apparatus consists of a crank and levers, which move the type wheel up to the paper and the paper roller on its fixed screw axis, by means of a click, click wheel, long pinion, and spur wheel; a blackened ribbon is used to make the characters visible; the dials of both instruments contain ivory studs, which assist their action, and enable the instruments to be adjusted.

It is proposed to lay the long conducting wires in grooves (filled with asphalt), in wood pavement, or railway sleepers.

A method of "taking copies of surfaces, for instance, the surface "of printers' types, at distant places," is described and shown. Somewhat similar apparatus is used at each station; two pendulums regulate each other by the first method herein described in relation to electric clocks, and complete the electric circuit through short

insulated wires in a frame in contact with printers' type at the telegraphing station; at the receiving station, the type is copied by the wires, in a series of small dots, on paper moistened with prussiate of potash and nitrate of soda; the type and moistened paper are lowered alike by the action of the electric current in connection with clockwork.

A signal telegraph is described and shown, in which the hand points to I or V according to the direction of the current, and is moved by two semicircular magnets, as in the fourth electro-magnetic arrangement.

A method of conveying intelligence to police or fire stations is also described and shown. By clockwork, inlaid metal wheels complete and break a circuit the requisite number of times, thus causing a hand at the other stations to indicate the number of the station by the last method herein described in relation to electric clocks.

[Printed, 3s. 5d. See Mechanics' Magazine, vol. 52, p. 101; and Artis vol. 2, pp. 82 and 99.]

A.D. 1843, June 15.—N° 9786.

BARRATT, Oglethorpe Wakelin.—"Certain improvement "in gilding, plating, and coating various metallic surfaces," relating:—

To a voltaic battery for "the deposition of metals," consisting of lead, carbon, and solution of chloride of sodium. "The products "of the battery are chloride of lead and caustic soda mixed "with carbonate of soda, the value of which products is con-"siderably greater than the expense incurred in the deposition "of the metal."

To another battery for the deposition of metals, consisting of zinc, carbon, and water. Fifty cells are recommended for gilding and silvering, and plumbago crucibles may be used as negative plates.

To "obtaining electricity continuously from the magnet" for the deposition of metals. "An electrical-magnetic battery, or "battery of magnets," is made by fixing firmly in wood any number of magnets, and forming a continuous metallic circuit, by connecting opposite magnetic poles by means of iron wire. The north pole of the first magnet must be connected with the work to be coated by a copper wire, and the south pole of the last magnet is connected to the dissolving plate by an iron wire. Rotary motion is not required in this arrangement to evolve electricity.

To "the dissolving of the metals." An aqueous solution of "nitrate of potash, chloride of sodium, and sulphate of alumina "and potash" is made, and the metal is dissolved in it by suitable battery arrangements until a proper deposit is obtained. The other solvent solutions that may be used are:—For silver, "chloride "of sodium or hyposulphite of soda, or cyanide of potassium;" for "gold, platinum, lead, silver, paladium, & other metals," chloride of sodium and boracic acid, or chloride of sodium and tartaric acid.

[Printed, 4d. See London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 28.]

A.D. 1843, October 27.—N° 9917.

HULL, Alonzo Grandison.—"Improvements in manufac-"turing or improving fermented and distilled liquors."

These consist in "passing a current of electricity through a "current of wine, spirits, beer, or other fermented or distilled "liquors by means of an electrical apparatus," in order to "improve the quality of the liquor so operated upon by perfecting "the fermentation, and thereby giving to the liquor a property "similar to that usually acquired by age, and likewise affording a "means of separating the acetous part of the liquor from the "general mass." A method of effecting this object is given by "inserting the poles of a galvanic battery into the liquor;" the kind of battery to be used, the time of its action on the liquor, and the disposal and size of the poles, are set forth. "The most "acid condition of the liquor will always be at the positive pole, "and from which any quantity may be drawn in case the acid "should be too redundant to be mixed up with the mass."

[Printed, 3d. See London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 121.]

A.D. 1843, November 9.—N° 9932.

BUSH, William.—"Improvements in rendering magnetic "needles less prejudicially influenced by local attraction," consisting of "a mode of constructing a marine compass, whereby "the local attraction may be centralized in or near the axis of "motion of the magnetic needle."

The compass bowl has fixed to its under part vertical magnetic bars, "chain, tubes, or other forms of steel or iron," supported by

an "universal joint;" they "act as a pendulum and conductor" and receive "the magnetism of all the iron which might sur-"round" them. Either a single bar may be placed with either pole uppermost, or tubular magnets may be disposed concentrically with alternate poles uppermost, there being a space between. The outer tubular magnet or collection of magnets are shown concentric with the needle centre in plan, and the outer casing of these vertical magnetic bars is of brass "to protect the magnetic "bars or tubes from corrosion." "Where the barometer is "required" the middle magnetic bar "may be removed, and "mercury substituted;" in this case there is a "magnetised steel "or iron cistern, connected with the magnetic tube, through "which the mercury will ascend, serving also as a balance for the "bowl or basin, which is supported by it." Magnetic needles are described and shown, with 8, 6, and 4 points, respectively having 4, 3, & 2 similar poles, also one needle with 2 north poles and one south pole. In this invention, the bowl contains a cistern of mercury in which the "axis of the compass" floats by means of a "float of cork." A hollow cone is "placed under the needle; "this cone on its under slide" [side?] "has an agate to receive "the upper end of the axis affixed on the float, and on its upper "surface it has another agate to receive the lower end of the "point" "of the needle; and in case the cone is not used, then "the axis affixed in the float receives the magnetic needle, it "being provided with a suitable agate to receive the point of the "axis."

[Printed, 11d. See Repertory of Arts, vol. 4 (*enlarged series*), p. 81; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 412; and Mechanics' Magazine, vol. 46, p. 372.]

A.D. 1843, November 18.—N° 9946.

WALL, Arthur.—" Certain improvements in the manufacture "of iron."

This invention consists in the use and application of certain "substances, and of the agency of electricity in the manufacture "of iron." Either operation may be applied "independently of "the other." In the second operation, the metal is subjected, "whilst in a fluid state, and also whilst in the act of congealing "or solidification, to a current of electricity," which is caused "to traverse as completely as possible throughout the entire

"metallic mass." When the metal runs into a mould it may be made to complete the electric circuit, or it may run around or over a wire included in the circuit. Any kind of electricity may be used, but that from a Grove's or Smee's battery is preferred. The current may be transmitted during solidification and then stopped, or in casting ordnance it may be continued for some time after the metal has entirely solidified. "In applying electricity to "iron in a smelting furnace or cupola," one battery pole is inserted at the tap hole, and the other "into the upper and posterior part "of the hearth, or in at one of the tuyre holes or apertures," both poles being in contact with the iron. "In applying electricity to "the iron in the pudding or balling furnace," a rod connected with one pole is inserted into one part of the fused metal, and a rod connected with the other pole has an insulated handle attached to it so as to enable it to be moved about; "thus making the "electrical current pass through the metal in every possible "direction."

[Printed, 3*d*. See London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 426; and Engineers' and Architects' Journal, vol. 7, p. 197.]

A.D. 1843, December 8.—N° 9982.

SCHOTTLAENDER, JULIUS,—1st. "Improvements in the de- "position of metals by electric agency upon various felted and "other fabrics, such as cloth, linen, leather, glass, earthenware, and "the like substances, not being themselves conductors of elec- "tricity."

To cover "linen or other cloth with a surface of metallic copper," it is cemented by the edges to the plumbagoed surface of a copper plate or matrix, and immersed in a solution of sulphate of copper, in connection with a galvanic battery and dissolving plate in the usual manner. The process may be continued until the copper has penetrated to the exterior of the fabric. The cupreous surface given to the material is plain or ornamented, according to the pattern of the matrix. Three apparatus for metallizing a length of fabric are described and shown; one, consisting of a roller immersed in the trough, round which roller the fabric is made to pass slowly. Another, in which sulphate of copper solution is made to drop upon a felted copper roller forming the positive metal, the fabric passing between this and another roller which forms the matrix. A third, in which the fabric is affixed

to copper matrices, placed round the sides of a single cell trough containing zinc and salt and water in porous cells, and solution of sulphate of copper. Details of working, and relating to other materials to be metallized, are given.

2nd. Improved batteries for generating electricity. The "con-"centric battery;" cylinders of copper and zinc separated by porous cells, and placed alternately. The "mercurial battery;" "alternate series of copper and mercury, separated by porous "diaphragms, and immersed in a solution of sulphate of copper." The "magnetic battery;" "two circular arrangements of horse-"shoe or other magnets, placed one within the other." The outer circle of magnets are coiled, and, when the inner circle of magnets revolve, an intermittent electric current is generated in the coils, electricity only passing when similar poles oppose each other.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 96; Mechanics' Magazine, vol. 41, p. 47; and Engineers' and Architects' Journal, vol. 7, p. 239.]

A.D. 1844, July 10.—N° 10,257.

HIGHTON, HENRY.—"Certain improvements in electric tele-"graphs."

Telegraphic communication is made by means of static electricity. At the transmitting station there are:—"An Armstrong's "hydro-electrical machine," "a Leyden battery" with its "Lane's "discharging electrometer," and a "transmitter." The spark signals, at the observing station, may be received over cardboard moistened with dilute sulphuric acid; or a clockwork arrangement may uniformly drive similar paper, over which a mark is made by hand each time a spark passes.

The "transmitter" may consist of three non-conducting radial rotatible arms, each carrying a metallic ball, according to the position of which in relation to fixed balls (respectively in connection with the electrometer and outside of the Leyden battery), the discharges take place to the earth or to the distant station. Two of the moveable metallic balls are in electric connection with the earth and each other, and the remaining one with the distant station. Another transmitter is described, but not shown, (Figure 4 is not drawn,) in which a revolving wheel has jointed metallic radii that can be raised upwards, thus completing the circuit to a distant station.

Signals may be registered at the receiving station by sparks passed through acidulated paper, from wires not opposite each other, thus distinguishing between the positive and negative discharges; the paper is moved uniformly by clockwork, and the position and frequency in one direction of the discharge determines the signal.

Two ways of varying the signals are given as examples; in both of which each negative discharge is "taken to represent 0, and "each positive discharge the number 2, raised to the power of as "many places as the discharge comes after the first."

Chromate of lead may be used in addition to sulphuric acid, or not, to render the spark perforations visible.

An alarum may be sounded by an explosion of gunpowder, &c., by the spark.

[Printed, 6*d*. See Mechanics' Magazine, vol. 42, p. 122; and Engineers' and Architects' Journal, vol. 8, p. 55.]

A.D. 1844, July 30.—N° 10,277.

DENT, Edward John,—"Improvements in ships' compasses."

In this invention the following imperfections are sought to be remedied:—The "friction between the convex sides of the pivot "and the sides of the cup" in the centre of the needle and card, as they are mounted in ordinary compasses; the error owing to "the assumption that the magnetic axis of the needle coincides "with what is called the maker's axis; and "the unequal amount "of inertia" of the axis of vibration of the card, according to its position in reference to the needle, which the "gymbals" not vibrating in the same time, fail to check.

To remove these defects it is proposed to suspend "the "horizontal card in a similar way to the balance of a chronometer, "and with equal delicacy." "To remove the error arising from "the non-agreement of the marked or maker's with the mag-"netic axis," the card is made to invert, "so that either side of it "may be placed above or below."

An azimuth compass is described and shown, in which the axis of the card passes through the needle and card, and is supported at each end in bearings let into a rectangular frame which is screwed into a horizontal ring. This ring has two opposite projecting studs, that drop into slits in an exterior ring, which is mounted on "gymbals" if required for steering. The studs and

separate frame enable the needle to be turned on either side. A bar with "the ends screwed," to admit moveable weights, "is affixed at "right angles to the needle," to compensate for "the errors arising "from the deflection of the card from the horizontal plane."

A steering compass is also described and shown, in which, to prevent the prejudicial effects from sudden movements of the ship, the agate cup is made to slide freely up and down in guides, within a tube fixed to the needle. Above the cup, within the tube, a helical spring presses on the cup.

[Printed, 1s. 7d. See Repertory of Arts, vol. 5 (*enlarged series*), p. 222; and Engineers' and Architects' Journal, vol. 8, p. 91.]

A.D. 1844, October 22.—N° 10,362.

NAPIER, James.—The title of this invention is "Improvements "in treating mineral waters to obtain products therefrom, and for "separating metals from other matters," and the invention relates to:—

1st. "The treatment of mineral waters impregnated with copper "and iron."

2nd. "The application to metallic ores when in a fused state "of a current of electricity, so as to separate therefrom the metals "which they contain." The electric current is made to traverse the already fused flux and ore, by using a "crucible, or other "convenient vessel, made of an electro-conducting material," and an iron plate, placed on the surface of the fused mass; the whole connected with a suitable galvanic battery. The positive pole of the battery is connected with the iron plate, and the negative pole with the crucible (insulated in its interior, with the exception of the bottom). The electric current thus traverses the liquid, and, "the heat being kept up," causes the metal to be "reduced and "deposited at the bottom of the crucible." The proportion of battery power to the quantity of ore is minutely stated, and a plan described, in which merely the galvanic current from the iron plate to the bottom of the crucible is used.

[Printed, 4d. See Repertory of Arts, vol. 6 (*enlarged series*), p. 48; and London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 402.]

A.D. 1844, October 29.—N° 10,366.

PARKES, Alexander.—Methods of manufacturing various white or pale-colored alloys are described under five heads.

Under the sixth and last head, are described methods of depositing metals "by electric currents from their salts when in a state of "fusion." The "iodides, chlorides, and phosphates" have been found most advantageous for the above purpose, but any salt may be employed that is "capable of holding the metals when in a "fused state." These salts may be combined with other salts that will not decompose them.

To deposit silver; a silver plate and the article to be coated are properly connected with a suitable electrical apparatus and immersed in fused chloride of silver; iodide of silver may also be used; if a large bath is required, iodide of potassium may be used in combination with iodide of silver; the "idodides" [iodides?] "of "mercury or copper" may also be combined with iodide of silver.

For gold, iodide of gold is used in combination with the iodides of potassium or sodium.

This process may be "applied to other metals," and "is applicable "with the salts of platinum, of copper, and of zinc."

[Printed, 4*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 32; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 378; Mechanics' Magazine, vol. 43, p. 58; and Engineers' and Architects' Journal, vol. 8, p. 264.]

A.D. 1844, December 18.—N° 10,441.

WALL, ARTHUR.—"Certain improvements in the manufacture of "steel, copper, and other metals."

In regard to steel, "bars of wrought or other iron," "intended "for conversion," are placed "in the usual boxes and furnace," or a retort or converting chamber may be used. An electric current, by preference from 100 pairs of Smee's battery, is then transmitted through the bars "antecedent to and during their conversion "into steel." In practice, the electric current is transmitted through the bars from the time they attain a red heat, until "one "of the pole bars" is found on examination to have become perfectly converted. The process "is equally applicable to "blistered steel, and to cast steel (See Letters Patent, N° 9946). The bars are arranged in supporting blocks in horizontal series, and in rows "by superposition." The openings between the supporting blocks must be filled up with fire clay; and between the bars of metal, charcoal or charcoal and chalk in fine powder is placed.

In applying the invention to copper, tin, and zinc, those metals are subjected during fusion and cooling to a current of electricity

in the same manner as cast iron is treated in the description given in the Specification of the Letters Patent, N° 9946, except that the connecting wire is of platinum.

[Printed, 7*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 348; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 29; Mechanics' Magazine, vol. 42, p. 443; Artizan, vol. 5, p. 256; Patent Journal, vol. 3, p. 459; and Engineers' and Architects' Journal, vol. 8, p. 297.]

A.D. 1844, December 27.—N° 10,447.

PINKUS, Henry.—The title of this invention is:—" Improve-" ments in obtaining and applying motive power to impelling " machinery." The invention relates to " the construction and " working of pneumatic or atmospheric railways, and applying " the motive power to the impelling machinery connected there-" with, through the agency of the auxiliary power of atmospheric " air." " Some of the methods herein described are applicable to " propulsion, to effect transit on canals and on common roads."

Electricity is employed to heat and soften " a cement " that seals the longitudinal valve. " An electric trough in the first carriage " heats an insulated metal blade, or wheels with insulated metal peripheries, that move " along the groove of the main pipe that " contains the cocoa-nut oil," " which is solid at common tem-" peratures." The blade or wheel may be used both in unsealing and sealing the valve.

In working the " locomotive atmospheric system," in which a locomotive is impelled in consequence of its communication with an atmospheric main by means of a hollow tongue, it is recommended to use the " electro-magnetic breaks" described in N° 8644.

The Specifications of the following former Patents are referred to in this Specification, viz.:—N°s 6570, 6885, 8207, and 8644 besides the Specifications of certain Irish and Scotch Patents.

[Printed, 16*s*. 3*d*. See Engineers' and Architects' Journal, vol. 8, p. 265.]

A.D. 1844, December 31.—N° 10,450.

BAIN, Alexander.—1st. Registering the progress of ships through water. A magnetic needle, mounted as a compass needle, is made to mark the direction and distance of the ship's course on properly divided drawing paper placed under it. For that purpose a horizontal circular coil surrounds the compass box, through

which coil an electric current is made to pass at certain intervals of distance by clockwork, actuated by rotating vanes immersed in the water; when electricity traverses the coil, one end of the needle dips, and marks the paper; a spring and ratchet wheel then works a right and left handed screw on the needle, which moves the marker and its counterpoise radially. Thus the direction and distance travelled are registered.

2nd. Indicating the progress of a ship by placing the indices inside the rotator. Electric power is not used.

3rd. Registering the direction of a ship's course at certain intervals of time, by an exactly similar means to that employed in the first improvement, except that the electric circuit is periodically completed by a chronometer, and the drawing paper is ruled radially for time instead of distance.

4th. Printing the direction of a ship's course, and the distance travelled. By clockwork (through a length of plaited wire rope) the rotating vanes actuate rollers containing divided paper and carbonised ribbon, and at intervals cause a hammer to fall on a graduated ring fixed to the compass needle, and thus print the degree under it.

5th. Ascertaining the temperature in the holds of ships. An electric circuit (completed by the expansion of mercury in a tube by heat) traverses coils through which a magnetic ring, fixed to the pointer axis, passes. The magnetic ring consists of two semicircular permanent magnets, with similar poles opposite, and moves together with the pointer, on the completion of the circuit.

6th. Taking soundings at sea. Vanes (rotating only on the descent of the lead) complete an electric circuit, at certain intervals of depth, by wheelwork, and cause indicator wheels to be actuated by a click connected with the axis of a similar apparatus to that of the fifth improvement.

[Printed, 1*s.* 10*d.*]

A.D. 1845, March 10.—N° 10,548.

WRIGHT, THOMAS.—"Certain improvements in apparatus for "the production and diffusion of light," consist in "a method of "producing a permanent light by continually presenting one or "more fresh points or surfaces of carbon or other suitable mate- "rial to the path of an electric current." This is effected by

sending a galvanic or other electric current through "circular "discs" of carbon, "mounted upon axes revolving in bearings" attached to a non-conducting frame, and adjustable at various distances from each other; or a separate current may be sent through each pair of discs; by suitable wheelwork, connected with "a "weight or other prime mover," the discs are made "to revolve "with a slow and uniform motion." "In order to bring about "the desired effect" two neighbouring discs connected with opposite poles of the same battery, are brought into contact, and as soon as the points of contact are sufficiently ignited the discs "are to be withdrawn out of contact, when a brilliant and perma-"nent" electric light will be evolved. A ground glass globe, or system of mirrors, or any other convenient method, may be used to diffuse the light equally.

[Printed, 5d. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 194; and Engineers' and Architects' Journal, vol. 10, p. 355.]

A.D. 1845, April 17.—N° 10,625.

PIGGOTT, William Peter.—"Certain improvements in mathe-"matical, nautical, optical, and astronomical instruments, and in "the mode of manufacturing dials and other graduated plates."

These improvements consist in the application of the electrotype process to the manufacture of the above articles, and the invention consists of two parts, viz.:—

1st. "Producing graduated plates, such as those employed or "used for barometers, thermometers, quadrants, compass, sun "dials, clocks, and such like instruments requiring plates accu-"rately divided or graduated." A plate is prepared "of suitable "size for the purpose intended," and graduated and engraved as may be required. A mould or matrix is taken from this original, either in wax or by the electrotype process, and any number of copies of the original plate are obtained from this mould by the electrotype process. They are afterwards finished "in the ordi-"nary manner by silvering, which may also be done by the electro-"type process."

2nd. "A new mode of manufacturing the compass box or case "containing the magnetic needle." To obviate the local attraction from small particles of iron, existing in compass boxes as ordinarily manufactured, a mould or matrix is made "of wax or other suit-"able composition," and electro-coated to the required thickness

with copper or other suitable metal; or copper may be deposited "in the form of a sheet or block," and afterwards worked "into "the form required."

[Printed, 3d. See Repertory of Arts, vol. 7 (*enlarged series*), p. 239; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 338; and Engineers' and Architects' Journal, vol. 8, p. 358.]

A.D. 1845, May 6.—N° 10,655.

WHEATSTONE, Charles, and COOKE, William Fothergill.—"Improvements in electric telegraphs and in apparatus relating thereto, part of which improvements are applicable to other "purposes," consisting of :—

1st. Applying soft iron within the coils for deflecting the magnetic needles of electric telegraphs, the needles not being an "astatic combination," but having similar poles similarly disposed, and being themselves external to the coils (See N° 7390).

2nd. Applying stops to "pointer telegraphs" for limiting the deflection of a magnetic needle or pointer to one direction. When two needles or pointers are used, one can thus be made to deflect in one direction only, and the other in the opposite direction only (See N° 7390).

3rd. Disposing the pointer or pointers (in pointer telegraphs) so that the dial plate shall be horizontal, or nearly so (See N°s 7390, 7614, and 8345).

4th. Giving audible signals at the same time that visible signals are made by a needle or pointer, a distinct and different sound being given for each direction of deflection of the pointer. This is proposed to be done either by the pointer itself striking a bell, or by alarum mechanism; examples are given in regard to alarum apparatus described in former Specifications and in the present Specification (See N°s 7390 and 7614).

5th. Giving signals in electric telegraphs by motions of a pointer in quick succession to form one signal, the difference between the signals being the number of motions, their direction, and the combinations of these. Under this head is described a needle instrument having the 1st, 2nd, and 4th improvements; in which the electric circuit is continuous through the coils of each instrument at each station; the earth circuit returns the current, and audible sounds, correspondent to the motion of the needle, are given by alarums, the needles including them in a short circuit by

striking against a stop when deflected. In working this instrument, the key making connection also breaks the main circuit by a spring and admits the battery to act on it; there is one key and spring to each direction of deflection, being "four points of contact "to be made and separated" (See N^os 7390, 8345, and 9465).

6th. Actuating a pointer by means of an electro-magnet or electro-magnets, the pointer being brought to rest by springs and stops instead of by gravitation, and being prevented by stops from touching the electro-magnet. Various methods are described and shown of acting upon a pointer, either magnetic or mounted with permanent magnets, by an electro-magnet, so as to cause it to deflect in one direction or the other according to the direction of the current (*i. e.* the polarity of the electro-magnet); all depending upon the principle that the poles of the permanent magnet will seek opposite poles of the electro-magnet, and applications of the 2nd, 3rd, 4th, and 5th improvements are set forth (See N^os 7390 and 8345).

7th. "Applying a portable telegraph at any part of a long line "of telegraphic wire" without disuniting its continuity. A battery at the terminal station constantly sends a current along a telegraphic wire, and the signal apparatus is interposed between it and the earth circuit wherever required; or the battery and signal apparatus may be so interposed, thus enabling the current to be transmitted in either direction (See N^os 7614 and 9465).

8th. Using the "derived current" (a short branch circuit taken from the main wire without disturbing its continuity) to communicate to a sensitive signal apparatus the signals making through the wire.

9th. Applying the 1st improvement to galvanometers by filling up the space within the coils with soft iron.

10th. Letting off alarums or electric telegraph clockwork by the falling of a hammer previously raised by the clockwork, the clockwork at the same time assisting to withdraw the keeper of the letting-off electro-magnet.

11th. "Employing two voltaic magnets to act in concert" to let off electric telegraph clockwork.

12th. "Substituting voltaic magnets for permanent magnets" in magneto-electric machines; for instance, in that described and shown in N^o 8345.

13th. "The application of leaden tubes formed over covered "wires" to the iron telegraph wires, "to be suspended in the air," as described in N° 9465 (See also N° 7614).

[Printed, 3s. 2d.]

A.D. 1845, May 22.—N° 10,684.

NAPIER, James.—The invention forming the subject of these Letters Patent is the same as N° 10,362. By the former Letters Patent the invention was protected in England, Wales, and the town of Berwick-upon-Tweed; and these Letters Patent were granted to extend the protection to the islands of Jersey, Guernsey, Alderney, Sark, and Man, and also all Her Majesty's Colonies and Plantations abroad.

[Printed, 4d.]

A.D. 1845, August 4.—N° 10,799.

YOUNG, William, and McNAIR, Archibald.—An "im-"proved method of manufacturing electric conductors," by covering metallic wires with plaited cotton threads, and introducing them into a leaden pipe filled with pitch.

Two machines are described and shown, for introducing the cotton-covered wires into a lead pipe filled with pitch. The top plate of an hydraulic press has a cylindrical chamber for hot lead; the action of the press squeezes the lead round the wires, they having already passed through a cistern of fluid pitch connected with the piston of the press, and moving with it. The wires (in a state of tension) are drawn through the cistern and a "hollow rod," to a "tubular core" and "die" moving in the lead chamber, which regulate the supply and shape of the pitch and lead supplied to the wire. The first machine has the lead cylinder between the hydraulic press and the tank, the tank being supported by the piston of the press; but the second machine has the hydraulic press between the tank and the lead cylinder, the tank being fixed to the press cylinder, but adjustable on it.

A cast iron box, with mercury cups, is described and shown, in which the lengths of wires are connected, when they are laid in the ground.

It is proposed to use the leaden pipes for "returning the electric "currents."

[Printed, 1s. 5d. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 424; and Engineers' and Architects' Journal, vol. 9, p. 249.]

A.D. 1845, September 25.—N° 10,838.

BAIN, ALEXANDER.—"Improvements in electric clocks and tele- " graphs, part of which improvements are applicable for other " purposes," consisting of:—

1st. Placing telegraphic wires in a railway fence. Roads are crossed either by imbedding the wires in asphalt in the ground, or by carrying them to a sufficient height in wooden posts.

2nd. Certain improvements in the I and V telegraph signal apparatus described and shown in N° 9745. First, a handle (carrying two insulated springs, and vibrating from a centre over pieces of metal inlaid in a wooden block) is made to change the direction of the current as may be required, according as the handle is moved to the right or left, the pieces of metal being suitably included in the circuit. Second, a method of discharging a bell, by a lever resting on a part of the pointer axis which has a flat side, that lets the lever drop when the axis is deflected for that purpose; a flat portion of the lever's axis then lets go a catch on a rod connected to the hammer lever, and the bell is rung. Third, various methods of combining and using the signals I and V, and repetitions of them; also of indicating certain signals, by giving those that intersect at a particular part of the signal table.

3rd. Applying the two semicircular magnets and their coils, used in the I and V telegraph, to work mechanism capable of giving numerous signals of various descriptions. The axis of the two semicircular magnets has slotted discs, which let go ratchet-wheel teeth, thus moving pointers. Arrangements are described for winding up the wheels, also a code of signals in which one or both pointers may be used.

4th. Employing the herein-before mentioned mechanism of the I and V telegraph to cause a "step by step" motion. Clicks on the magnets' axes act on sectors, thereby moving a long pointer to the right or left.

5th. A method of insulating long telegraph wires on posts, by placing them on metal covers which protect the insulator underneath from wet.

6th. The application of the 3rd improvement to deflecting a pointer on the magnet axis, at the same time letting a weight fall opposite the signal to be given.

7th. Causing a pointer connected with clockwork to revolve until it arrives opposite the required signal, by releasing and after-

wards stopping a wheel similar to "the contrite wheel of a verge escapement watch," but having no teeth. For this purpose a bar magnet, passing through coils, is moved to and fro by the electric current. Pointers are also attached to the bar magnet, and a peculiar signal table is used.

8th. Letting a weight fall over a signal table, and causing another to move horizontally, by an application of the 3rd improvement. The weights are wound up by a separate spring handle and pull frame.

9th. A signal table, in which the signals given are indicated by the signal at the intersection of two elementary signals (I and V, or a revolving pointer). The elementary signals are in the circumference of a circle, and they point to ultimate signals disposed in four squares, or in the intersections of the lines proceeding to them.

10th. Improvements in electric clocks. A pendulum is worked by an application of the 7th improvement, in which the pendulum makes and breaks the circuit by striking against a "knee'd" bar resting upon points, one of the points being away from the circuit during the return vibration to allow the magnetic bar to fall by its own gravity against the pendulum.

This improvement is applied to work other clocks, a separate electric current for so doing being generated by reels on the pendulum rod passing over permanent magnetic poles.

11th. Improvements in printing telegraphs. The 7th improvement is applied to this purpose by providing a printing cylinder revolving by clockwork on a screw, against which (according to the direction of the magnet's motion) the end of the magnet or a spring presses.

12th. A "double connecting apparatus," to send a weak current through the near signal apparatus, but a strong current through the distant one. Two connecting apparatus (See 2nd improvement) are used with one handle, but the telegraph circuit is not closed by the upper springs.

13th. Causing the telegraph alarum, when released by the apparatus described in the 2nd improvement, to strike every second vibration of a pendulum by means of catch springs, until again adjusted. The pendulum is actuated as described in the 10th improvement.

[Printed, 7*s.*]

A.D. 1845, October 9.—N° 10,860.

PARKES, ALEXANDER.—"Improvements in coating or covering "certain metals with other metals and metallic alloys, and for "ornamenting the surfaces of various metallic articles."

The "improvements in coating, &c. metals" are comprised under the two following heads:—1st, coating iron with various metals and alloys; 2nd, coating copper and its alloys "with lead, "zinc, and tin." The coating in this part of the invention is performed by means of the melted metal in conjunction with certain fluxes.

The "improvements in embellishing metals" consist of:—

1st. "The production of a gold design upon a silver or other "metal surface," "by pencilling by hand or by printing from "plates or rolls upon paper the required design in any suitable "stopping varnish or colour," placing the design "on or in the "article to be embellished," gently rubbing or pressing the same, letting it dry, and electro-gilding the article by the "cyanides of "gold" in preference. The stopping-out varnish is then "removed by turpentine or alkalies or acids, and the design "may be left dead, or burnished as required."

2nd. "The production of a silver design upon a gold or other "metal surface." This is effected "in the same way as for a gold "design, only using silver solutions instead of gold, preferring "the cyanides."

3rd. "Producing a black or bronze design or ground upon a "gold, silver, or other metal surface," in the same way as for gold and silver, except that a solution is used, composed of muriate of ammonia, sulphate of copper, and distilled vinegar.

[Printed, 4d. See Repertory of Arts, vol. 7 (*enlarged series*), p. 358.]

A.D. 1845, November 4.—N° 10,919.

KING, EDWARD AUGUSTIN (*a communication*).—"The appli-"cation of continuous metallic and carbon conductors, intensely "heated by the passage of a current of electricity, to the purposes "of illumination." A galvanic or other electric current, "suitably "regulated," is made to traverse a thin sheet of platinum foil (the method of obtaining which is described) properly mounted in an adjustable stand, so that "it attains the highest temperature it "will bear without fusing;" a glass shade "may then be placed

" over the apparatus." When carbon is used, "it should be " be enclosed in a Tooricelieu " [Torricellian?] "vacuum," "it " may be employed where a very intense light is required. When " an intermittent light for the use of lighthouses, or for other " purposes is required, it may be obtained by breaking the circuit " at intervals by clockwork." "When the apparatus is suitably " sealed it may be applied to submarine lighting," also to the illumination of "powder magazines, mines, &c." "When a " current is of sufficient intensity, two or more lights may be " made in the same circuit, care being taken to regulate the " power."

[Printed, 7*d*. See Repertory of Arts, vol. 7 (*enlarged series*), p. 335; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 348; Mechanics' Magazine, vol. 44, pp. 312 and 343; Patent Journal, vol. 1, p. 20; and Engineers' and Architects' Journal, vol. 9, p. 220.]

A.D. 1845, November 13.—N° 10,939.

BRETT, JACOB (*a communication*).—This invention is entitled " Improvements in printing communications made by electric " telegraphs," and it consists of a "composing machine" for transmitting intelligence and a "printing machine" for receiving and printing it.

The composing machine is to break and complete the electric circuit, and to continue it broken or completed "in such a manner " as to cause any given letter to be printed by the printing " machine." This machine has a number of keys corresponding to the number of signs to be printed. Clockwork (moved by a weight) rotates a cylinder or "key shaft" with pins disposed helically on its surface, one under each key. At the end of the "key shaft" is fixed a "circuit wheel" having a plain and a cogged part; springs in the line circuit press upon each of these parts, and the revolution of the circuit wheel causes the circuit to be uniformly broken and completed until one of the keys is depressed; this causes the pin belonging to the key to stop the circuit wheel, and thereby continue the circuit completed or broken. The connection of the clockwork to the key shaft is by means of bevel friction wheels, and a "governor" is attached to the clockwork to equalize its motion, and to keep it in motion after the circuit wheel is stopped, so that the key shaft may readily resume its motion on being liberated.

The machinery composing the "printing machine" may be divided into the following parts:—That causing and regulating the revolution of the "type wheel," which is rotated by clockwork having an escapement worked by electro-magnets magnetised and demagnetised by the breaking and completing of the circuit at the composing machine; the type-wheel is also the escape-wheel, and has pins for that purpose. That carrying the paper-cylinder to and from the type-wheel, consisting of separate clockwork giving motion to a shaft having excentrics, whenever the type wheel stops; the paper-cylinder being moved up against the type by rods connected to the excentrics, and having a rotary motion at the same time by means of clicks and a click wheel; the paper may either run off as the cylinder revolves, be moved helically by working on a screw axis, or parallel to itself by a "spring guide," "cam," and "racket" [ratchet?] wheel; a roller revolves in slotted bearings in contact by its weight with the type-wheel, which it supplies with plumbago from a groove covered with cloth. That enabling the excentric-shaft to revolve only on the stoppage of the type-wheel; a lever, resting upon one of the signal pins in the type-wheel, carries a detaining pin, which is kept in contact with a shoulder on an excentric catch wheel fixed to the excentric shaft, whilst the type-wheel is in motion, by the signal pins striking against the lever and preventing its descent; as soon however as the type-wheel stops, the lever descends, the pin drops away from the shoulder and the excentric shaft turns a portion of a revolution, until a second shoulder on the excentric catch wheel stops it, in the mean time having moved the paper-cylinder up to the type. When the type-wheel again rotates, it raises the detaining pin from this second shoulder and permits it to revolve as far as the first shoulder, where it is ready for another stoppage of the type wheel. The lever can rise rapidly, but can only fall gradually, in consequence of a rod attached to it working an "hydraulic regulator" on the principle of the common pump, in which, when the lever is raised, it only lifts the weight of a valve which causes a chamber to be filled with water; but when it descends it has to force a portion of the water out, which takes sufficient time to prevent the descent of the lever upon the signal pins whilst they are in motion. An alarum is made to strike, every revolution of the excentric catch wheel, by a pin striking against the hammer lever; during the use of the telegraph, the hammer lever is secured from the bell by a hook.

Another method is described of driving the escapement, by means of permanent magnets moving up and down in coils, giving motion to an excentric, by the assistance of clockwork set free by studs at each movement of the magnets; this plan may either be worked by the line circuit, or by a local circuit completed and broken at the same intervals as the line circuit, also by permanent magnets and coils.

An "Oceanic line" may be used in connection with the printing apparatus, in which the wires are varnished, bound "with waxed "or sere cloth," platted with waxed or greased twine, and around the whole a platted cable saturated with tar is formed; metal weights coated with bitumen and ballasted are attached to the cable at intervals of a mile or more; tubes coated with bituminous substances (having openings fitted with water-tight coverings) are used to protect the cable on or near the shore. The wires may be coated with various colors to distinguish them.

[In America this telegraph is known as "House's telegraph."]

[Printed, 1*s.* 5½*d.* See Artizan, vol. 5, p. 110.]

A.D. 1845, December 20.—N° 11,010.

CHURCH, Jabez.—"Certain improvements in the manufac-"ture of coke, and in the ovens for producing the same," in which the following points are observable:—

A quantity of coal is thrown into the oven, sufficient to cover the floor to a certain depth, and as the oven is being charged the charging aperture is partly built up. The coal is then ignited and the passages of a "regulator," which admits air to the coal, are gradually closed until the body of coal has become fairly ignited, when "they are wholly shut."

Valves and passages passing under and around the floor of the oven (not communicating with the coke), are then opened, which admit air to cool down the coke. The coke is not removed from the oven until it "has been thoroughly cooled," thus superseding throwing cold water on the hot coke.

If it is desired to obtain a coke more than usually free from sulphur, &c., as soon as the apertures admitting air to the coke are closed, a current of electricity from "a powerful electric "battery" is transmitted through it by means of "iron rods" inserted through the brick work connected with the poles of the

battery, the positive pole being near the bottom, and the negative pole lying on the top of the coke.

[Printed, 9d. See Repertory of Arts, vol. 8 (*enlarged series*), p. 224; Mechanics' Magazine, vol. 45, p. 121; Practical Mechanics' Journal, vol. 1, p. 204; Patent Journal, vol. 1, p. 77; and Engineers' and Architects' Journal, vol. 9, p. 284.]

A.D. 1846, January 20.—N° 11,051.

NOTT, JOHN.—"Certain improvements in the means of com- "municating intelligence from one place to another," consisting of:—

A telegraph signal apparatus in which a hand is made to point to the letters of the alphabet on a circular dial-plate; there are four sets of alphabets on the dial-plate, and a corresponding number of numerals, the letters being pointed to by one end of the hand and the numerals by the other. Two electro-magnets, worked by the main circuit, act upon "two jointed lever armatures," causing them to raise two pallets simultaneously, which rotate a ratchet-wheel connected with the pointer; one pallet raises the ratchet-wheel one tooth by the attraction of the magnet, and the other depresses the opposite side of the wheel one tooth by the reaction of springs on the levers when the magnetic force ceases. By this means a step-by-step action of the pointer is obtained, one tooth of the ratchet-wheel moving the pointer one letter. "Latch stops," acting on the pallets, "produce a dead beat escapement." The electro-magnets are horseshoe formed, and placed so as to act upon opposite arms of the jointed lever armatures, thus forming "a magnetic circle."

A signal bell apparatus is described and shown, consisting of a horseshoe electro-magnet with a T-shaped keeper, one edge of which is always in contact with the poles; the tail of the keeper raising the arm of the hammer lever strikes the bell. "The reactive force "of electric induction" is, by the arrangement of these three magnets, enabled "to destroy the attractive force" as soon as the circuit is broken.

The direction of the current is changed from the telegraph to the bell, and *vice versâ*, by means of wooden drums (in connection with springs included in the circuit) partially covered with metal, brought into action alternately by levers on their axes and a connecting rod. The circuit may be closed for the reception of signals by a "lever" let go by a "stop" that depresses the signal key.

A "commutator or pole changer" for reversing the direction

of the electric current is described and shown, consisting of a "wooden cylinder" (moveable on an axis) with inlaid strips of metal, one of which lays across its periphery, and the others are connected parallel with the periphery or across, by imbedded wires. Springs in connection with the circuit press against the pieces of metal and the direction of the current is according to the position of the cylinder.

Two "rheopeters" are also described, which transmit the current to one station or to another, or through the telegraph or main circuit, according to its direction, as determined by the "pole "changer." The first consists of a wooden block, at opposite points of which are mounted, vertically, two permanent horseshoe magnets with their similar poles opposite; between them a bar of soft iron is free to move on an axis, in a horizontal plane; this bar being magnetised by the current which it carries with it (by a wire dipping into mercury cups connected with the circuits required to be completed or discharged), changes the position of the wire to the required mercury cups, according to its polarity. The second "rheopeter" consists of a similar arrangement mounted vertically, the poles of the magnets being one over the other, and the electro-magnet moving vertically; each pole of the electro-magnet is coiled separately, and the ends of the coils are immersed in mercury cups on the same side of the centre, each being included in a circuit which it may be required to complete or interrupt; this, however, can be done without interrupting the electric current, as before one pair of wires leave one circuit the other pair may complete another circuit; when the bar is horizontal the current proceeds in two different directions at once.

A telegraph post is also described, to be "imbedded in Roman "cement," consisting of "a wooden lantern-shaped box" completely covering the upper end of the post so as to protect it "from "the humidity of the atmosphere;" it has a "pyramidical" cover "firmly fixed on the top of the post," and a case "fastened to the "cover," so as to completely envelope the top of the post containing "binding screw clamps" "which carry the telegraph "wires;" a lightning conductor passes to the earth outside the box.

[Printed, 1*s*. 5*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 97; London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 377, and vol. 30 (*conjoined series*), pp. 116 and 201; Artizan, vol. 5, p. 12; Patent Journal, vol. 2, pp. 506 and 542; Engineers' and Architects' Journal, vol. 10, p. 56; and Common Bench Reports, vol. 4, p. 462.]

A.D. 1846, February 3.—N° 11,070.

HIGHTON, Henry.—This invention is entitled, "Improvements in electric telegraphs," and it consists of the use of the deflections of a gold or metallic leaf (included in the telegraphic circuit) under the influence of a magnet, to give signals in electric telegraphs.

For this purpose the "metallic leaf" is placed in a "glass "tube" "fitted in" two "brass caps" (one of which is removable), and the whole fixed in a suitable stand, with the pole of a magnet near to the leaf. Each time the circuit is completed the metallic leaf moves one side or the other, at each of the stations included in the circuit, according to the direction of the current. An alarum apparatus may be employed in connection with the above to attract attention.

[Printed, 5d. See Repertory of Arts, vol. 8 (*enlarged series*), p. 162; London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 267; Artizan, vol. 4, p. 239; Patent Journal, vol. 1, p. 261; and Engineers' and Architects' Journal, vol. 9, p. 321.]

A.D. 1846, February 7.—N° 11,076.

GREENER, William, and STAITE, William Edwards.—The title of this invention is:—"Certain improvements in ignition "and illumination." The invention relates to "effecting the "illumination of public and private buildings, streets, squares, "and other public places, by means of solid prisms or cylinders "of carbon enclosed in air-tight vessels of glass or some other "transparent substance, and ignited or rendered luminous by "currents of voltaic or magnetic electricity, such carbon being "previously freed from the impurities with which it is ordinarily "combined, and divided on the surface thereof into numerous "acute points." Also "rods or strips of platinum" may be used in conjunction with carbon.

Pure carbon is obtained by the following process:—Lamp black, or (by preference) Church's purified coke (See N° 11,010), is digested in dilute nitro-muriatic or other acid, strained, washed in a weak alkaline solution, and washed in distilled water until no traces of impurity are perceptible; it is then dried, and by pressure converted into solid prisms, or into cylinders both solid and hollow; it may then be subjected to intense heat for twenty-four hours. "By opposing two such acuminated surfaces the one to

"the other," if the electric currents should cease "between any "two points" they "will be kept up by the remaining points." When hollow cylinders of carbon are used in conjunction with hollow cones of platinum, they are put between the platinum cones whose bases must be placed facing. The carbon, or platinum, or other infusible metal, may either be "kept stationary "or made to rotate on its axis."

[Printed, 4*d*. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 157; Mechanics' Magazine, vol. 45, p. 160; Patent Journal, vol. 1, p. 216; and Engineers' and Architects' Journal, vol. 9, p. 285.].

A.D. 1846, April 30.—N° 11,188.

KING, EDWARD AUGUSTIN (*a communication*). — "Improve-"ments in the production of magnetic electricity," relating:—

1st. To "an improved method of constructing the coils for the "armatures of magneto-electric machines, by forming them of "flat strips of copper instead of wires." These are used when the armature is a "rectangular" iron bar; they lay edgeways to the bar, each part being "bent over itself at right angles" at each corner. When the strip "is of considerable thickness, it should "have grooves" "cut across it at intervals equal to the diameter "of the bar," to enable it to be "bent into the required form "without increasing its thickness."

2nd. To "a coil formed of plates or rings of copper soldered "together so as to form a spiral" [helix ?]. This is adapted to "a "cylindrical armature;" each ring "is cut open on one side," and a second ring soldered to it by the edges thus produced. "The "operation is continued until a coil of sufficient length is "obtained."

3rd. To "a mode of collecting all the currents of electricity "produced in magneto-electric machines having more than one "armature by a combination of springs pressing on separate "segments of the break, and in using the current from each "spring separately, or combining them together into two currents "when desirable." The permanent magnets are so placed that alternate poles are adjacent to each other; all the terminations of coils on one side are in connection with an insulated metallic ring, and on the other side with insulated segments of a break (both on the revolving axis); springs (one to each segment) are arranged to press upon the segments when the springs are opposite to each

armature; the springs are fixed to the frame of the machine; according to the connections made between the springs, so is the direction and number of electric currents.

4th. "A method of preventing the formation of neutralizing "currents in the brass or other metallic plates forming the wheel "which carries the armatures." A saw cut is made from the edge to the hole through which the armature passes.

5th. "A mode of affixing an iron bar to each of the poles of the "magnets in magneto-electric machines, so that the armatures "are magnetised a second time by the same magnet during the "same revolution." Two bends are made in a piece of iron attached to the end of the pole of each magnet, which enable the magnets to act upon the armatures a second time by induction. In this case, the break has double the number of segments and springs as armatures, "the termination of each successive coil "being connected with an alternate segment." "The spring in a "line with the second bend in the bar is connected with the next "group of wires to the one to which it would from its position "belong."

[Printed, 6*d*. See Repertory of Arts, vol. 8 (*enlarged series*), p. 257.]

A.D. 1846, August 11.—N° 11,331.

JENNINGS, Henry Constantine.—The title of the invention is,—"A new method or apparatus or machine for the better or "more economic evaporation of fluids or liquids containing "crystalline or other matters to be concentrated or crystallized," and the invention refers principally to apparatus for evaporating fluids by the agency of caloric from steam or hot air, in conjunction with certain pneumatic apparatus, described and shown in detail. "The application of electricity to facilitate evaporation in the "concentration and crystallization of liquids" is also mentioned, and a description given of "a galvanic pile or battery of three "elements" placed in the pan charged with the liquid to be acted upon, but its place is not shown in the Drawings, neither is any further allusion made to the precise way in which it facilitates evaporation.

[Printed, 1*s*. 1*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 153; and Repertory of Arts, vol. 9 (*enlarged series*), p. 336.]

A.D. 1846, October 27.—N° 11,428.

MAPPLE, Henry.—"Improvements in apparatus for trans-"mitting electricity between distant places and in electric tele-"graphs."

This invention relates to:—

A method of "coating the conducting wires with a metal "covering," by enclosing them (already insulated with cotton, &c.) in a leaden tube, reducing the tube in size, and drawing it down with grooved rollers or "draw plates," it being introduced through a "hot water jacket;" the wires are threaded into the tubes by means of guide wires and slits, which are afterwards joined.

Preserving the metallic pipe by covering it with "coir rope," or other suitable material wound round it. "It is then passed "through a bath of hot pitch," "and while yet hot it is passed "through a trough of sand, during its passage through which the "sand is well rubbed into it by hand." It may be placed in a cast-iron pipe for further protection.

"Improving and steadying the action" of telegraph needles. They are suspended on a cranked axle, "from which project down-"wards two steel pins," which rest on "small square pieces of "agate or other hard material;" one of the pieces having a "conical hollow," and the other a "slot" "cut parallel to the "cranked axle." The needles are kept in a vertical position by having the lower ends heavy, and have two loose collars.

To impede the vibration of the needle, the lower end of the inner needle may dip into a vessel containing oil, or iron filings, or a bar of iron may be placed immediately under the needle.

A mode of constructing electro-magnets so as to prevent residual magnetism, by "winding the coil of covered wire on a "thin hollow reel" within which is placed the end of a piece of soft iron; this is attracted within the reel on the passage of an electric current.

[Printed, 1*s*. 4*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 347; and Patent Journal, vol. 2, p. 817.]

A.D. 1846, October 29.— N° 11,430.

REID, William.—"Certain improvements in the manufacture of "wire," more particularly electric telegraph wire.

One of these "consists in welding together (end to end, scarf " wise), two, three, or more rods of iron before they are drawn " into wire (instead of afterwards), and passing the welded as " well as the other parts through the drawing machine." This process is also applicable to steel wire.

The other improvement consists in a method of cleansing wire, " whether made of iron or steel, or copper or brass, or any other " metal or mixture of metals." This is effected by passing the wire from reels, on which it is placed as it comes "from the " annealing oven," over and under various vertical and horizontal rollers, through two "friction plates," and "into and through a " box containing sal-ammoniac or spirit of salt, whence it is " transferred as quickly as possible to the bath of metal to " receive its required coating." The vertical rollers have a horizontal "alternating" motion given to them by means of an excentric working into the traversing frame on which the vertical rollers are mounted. The horizontal rollers are so mounted upon a hinged frame, that when its two parts are separated every alternate roller is lifted up, thereby enabling the wire to be laid in its position for cleansing. The friction plates (containing wood or leather charged with emery, or sometimes files) have a rectilinear reciprocating motion given to them, either by a crank, connecting rod, and guides, or any other suitable means. Instead of this cleansing machinery, or in conjunction with it, " rollers covered " with bristles of hair," or other suitable material are used after the friction plates. The lower roller brush is made to revolve in any suitable cleansing substance. The speed of the traversing wire is regulated by that of the final reels on which they are wound.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 395; Mechanics' Magazine, vol. 46, p. 452; Patent Journal, vol. 2, p. 888; and Engineers' and Architects' Journal, vol. 10, p. 180.]

A.D. 1846, December 12.—N° 11,448.

PIAGET, LOUIS HYPOLITE, and DU BOIS, PHILIP HENRY.—The title of this invention is:—"Improvements in producing " ornamental metal surfaces;" and the invention relates to " improvements in depositing metal."

The following items are described at length:—

A bath for electrotyping; with sulphate of copper solution, porous cells, and zinc solution (composed of water, common salt,

fresh human urine, and sulphuric acid). An external vessel of earthenware contains an earthenware perforated shelf, with apertures for one or more porous cells, and a central hole for the "model." The "model" may be of "gold, silver, or copper," and should be cleaned with "plumbago and a brush;" its back is fixed in wood.

A silvering solution; composed of sulphate and carbonate of soda, and carbonate of silver in certain proportions, dependent upon whether electric currents are used or not. When electric currents are used a platinum wire is the positive pole in this solution.

An electro-gilding solution; consisting of an aqueous solution of phosphate and sulphate of soda, and chloride of gold.

A cylindric galvanic battery; for use in connection with the above silvering and gilding solutions, consisting of charcoal, dilute nitric acid, a mixture of sulphuric acid, common salt, and water, and amalgamated zinc.

A solution for gilding by immersion.

A method of preparing an electrotype model for gilding or silvering. It is placed in "essence of turpentine," washed, brushed, immersed in dilute nitric acid, in cold water, again brushed, placed in human urine, and finally again in cold water. After gilding or silvering, it is merely brushed with spirits of wine and rouge.

[Printed, 10*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 83; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 417; Patent Journal, vol. 2, p. 885; and Engineers' and Architects' Journal, vol. 10, p. 292.]

A.D. 1846, November 12.—N° 11,449.

STAITE, William Edwards.—Improvements in electric illumination, relating to:—

1st. Improved arrangements of electric light apparatus. In the first, the carbon electrodes are propelled by clockwork and formed differently, the bottom "conical," the other "flat." The bottom electrode has a guide piece of "two triangular pieces of platinum" connected to its tube by vertical springs; the electrodes are brought into contact by means of a "double scroll spring" bearing against the "sole plate" of the lamp. In the second and third arrangements, the electrodes meet laterally on a "non-conducting "and heat resisting substance" being constantly kept in contact therewith by springs; by means of a "slot" in the sole plate and

adjusting screw, the electrodes can approach each other or be moved apart, still bearing on the "non-conducting" substance. The fourth arrangement is the same as the first, except that the electrodes are inverted, the platinum guides to the upper electrode are supported by the lower on a ring of pipeclay, and the springs are helical springs on platinum spindles. In the fifth arrangement one of the electrodes is a platinum ring; the other a carbon tube filled with pipeclay entering loosely into the ring, and passed into a small pipeclay tube by a spring. All these arrangements have a glass cover fitting air-tight to the sole plate, and a valve to let out the rarified air.

2nd. Improved arrangements for obtaining an intermittent electric light by means analogous to those employed for breaking connection in electric telegraphs; two, three, or more wires and electrodes enclosed in various coloured glass covers, are used to convey intelligence, &c.

3rd. The obtainment of carbon for the electric light by heating and compressing in moulds a pulverized mixture of "Church's "patent coke." This is then plunged into a concentrated solution of sugar, and, when dry, submitted to a white heat in a close vessel for several hours.

[Printed, 9*d*. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 390; and Patent Journal, vol. 2, p. 886.]

A.D. 1846, December 12.—N° 11,480.

BAIN, Alexander.—"Certain improvements in transmitting "and receiving electrical telegraph communications, and in appa- "ratus connected therewith," relating to:—

1st. Methods "of arranging and combining apparatus for "transmitting and receiving electrical telegraph communications, "whereby mechanically-composed communications are trans- "mitted through electric circuits, and are received by chemically- "prepared surfaces, both apparatus being kept in motion by "mechanical means, without the aid of magnets." The description is given separately of the component parts of the machine as follows:—A method of composing an electrical communication into a mechanical form, consisting of a large circular plate, with numerous equidistant notches, carrying pins whose position determines the frequency and position of certain marks made at the receiving station; they are put into the required position by means

of a handle carrying a "forked instrument" and "driver," moveable on a vertical as well as a horizontal axis; when the communication is arranged, the circular plate is placed so that its axis is connected with the line circuit, and it is caused to revolve uniformly by clockwork; the pins thus come into contact with springs, by that means completing the circuit leading to the receiving apparatus in one direction or its opposite. The receiving apparatus is always in motion, and consists of prepared paper over which pairs of springs are made to traverse in a circular path, the uppermost pair only being included in the circuit; according to the direction of the current, one or the other spring marks the paper. Clockwork only is the motive power of this apparatus.

Another transmitting and receiving apparatus which are convertible, perforated paper and chemically-prepared paper being used for each purpose respectively. The clockwork of these machines is only released when required for use, by an electro-magnet acting on a detent; the paper (whether perforated or prepared) is unwound from a drum, and passes over a suitable conducting cylinder having springs to break and complete the electric circuit, according to the perforations in the paper at the transmitting station, and to register those interruptions and completions of the circuit on the prepared paper at the receiving station. Various methods of arranging the springs, conducting cylinders, and batteries, dependent on the reversal of the current, are described and shown

Either one or two line wires may be used in conjunction with the earth circuit. The chemical solution preferred for the preparation of the paper consists of sulphuric acid and a solution of "prussiate "of potass;" or, when private communications are desired, the paper may be merely saturated with sulphuric acid solution, the other solution being applied by the receiver. Telegraphic codes are shown in the Drawings, both for the double and single marking telegraphs. The Specification of N° 9745 is referred to in regard to transmitting a fac-simile of type by electricity on to chemically-prepared paper, the paper being moved progressively by means of an electro-magnet.

2nd. A method of constructing telegraph posts for line wires. Four thin lengths of wood are framed together like a box, and have cast-iron hoops, which descend and tighten the post on any shrinkage taking place, as the post gradually increases in size towards the bottom. In the upper part of the post a piece of

wood, carrying bolts insulated by India-rubber washers, is fixed, the bolts serving as brackets to carry the telegraph wire.

[Printed, 6s. 5d. See Mechanics' Magazine, vol. 46, p. 590, and vol. 47, pp. 26, 49, and 73; and Patent Journal, vol. 3, p. 75.]

A.D. 1846, December 14.—N° 11,481.

POOLE, Moses (*a communication*).—"Improvements in the con- " struction and working of electric telegraphs, and in apparatus " connected therewith, partly applicable to other purposes," con- " sisting of:—

Part A.—Various methods of suspending and insulating telegraphic wires. There are no stretching posts, the wire being stretched by temporary or permanent apparatus between the posts; resinized wooden plugs are used as insulators.

Part B.—A "communicator," in which the letters of the alphabet are always upright to the eye, being placed on a fixed dial, and pointed to by an "indicator;" the circuit is made and broken by the attraction of permanent magnets on a wheel, and the line wire circuit is closed for receiving messages by the same means; thus there are only two points of electrical contact instead of twenty-four. An alarum is used in connection with this communicator, in which the hammer is raised by a rack and wheel in acknowledging the signal; the core and keeper of the electro-magnet are of nickel.

Part C.—"An indicating apparatus" for an escapement telegraph. By arranging the letters on arms disposed helically round the axis, they are exhibited singly through a long aperture, so that each letter is always shown in the same part of the hole.

Part D.—A new escapement, "giving rotatory motion in one " direction to an axle" by means of the action of an electro-magnet on "a single vibrating piece," carrying two arms which act as "pallettes," and a third limiting the number of teeth that can pass without augmenting the resistance.

Part E.—Employing the reversal of the current in connection with the deflection of a magnetic needle and the coupling of the characters, in escapement telegraphs, "to reduce by one half the " average number of teeth passed per character telegraphed."

Part F.—Making earthenware insulators which are effective from rain blown laterally as well as descending vertically. In one

instance, the telegraph wire is placed in the eye of a metal supporter, which has two branches that are passed up the interior of the insulator, and being turned at right angles, rest on interior ledges. In another instance, the wire passes through a hole in the insulator which rests on the extremity of an iron spike driven into the post and passing up the insulator; a plate of zinc prevents "the rain beating up from below."

Part G.—Making telegraphic wire stretching apparatus with "the drum, rocket" [ratchet?] "wheel, and axle all of cast iron, "and all cast in one piece."

Part H.—A protective system applicable to suspended telegraph wires, to prevent them, when broken, causing injury "by the "sudden flying of the highly stretched wires." Various methods are described and shown of confining the telegraph wires in sufficiently short lengths by means of other insulated wire, &c., so as not to destroy their insulation.

Part I.—Employing rolled instead of wire-drawn iron for telegraphic wires; also lead and zinc wire enclosed in tubes, for the same purpose, using the least conducting material for the short distances, and the most for long distances.

Part K.—Employing nickel electro-magnets. In one case, the coil reaches to the extremity of the nickel, the brass end pieces having an aperture for the passage of the keeper, which is formed like a magnetic curve; or the armature may consist of a fork entering tubes carrying the coils; or small coils may be made to enter the tubes.

Part L.—Constructing magneto-electric machines, so that every time the tooth of an escapement telegraph passes, the armature and magnet come into contact. By using a wheel with three sets of suitably shaped teeth, into which levers actuated by springs work, the period of contact exceeds that of separation, and the variable attraction of the magnet for the armature is counterpoised: thus the resistance to working the machine is rendered uniform, a portion of the force expended at one time being restored at another time. The ends of the coils of the armature, by means of springs, are brought into contact once while near the magnet, and once while away from it.

Part M.—Constructing the armatures of magneto-electric machines so that a greater or less portion of the coil may be used. The inner extremities of each portion of the coil communicate

with inlaid pieces, with which connection is made at pleasure by means of indicators (one to each armature); the coil is made of larger wire as it recedes from the core.

Part N.—Employing unforged horseshoe steel magnets for telegraphic purposes made up of straight bars or blades bolted together, either in a V form, or in the shape of a parallelogram, by "having a piece interposed between their connected ends;" or the blades may be cut, "one in the other," out of steel plate, so that the leg of one blade is between the two legs of an adjacent blade; thus steel of less than one-eighth of an inch thick may be employed.

Part O.—A telegraph signal apparatus. Signals are given by varying the force of the electric current, in combination with the deflection of a magnetic needle, by the change of direction of the current. More or less series of batteries are included in the circuit according to the key pressed down by the transmitter, taking up more or less weights successively from a scale pan (at the receiving station) by means of an electro-magnet and levers; thus proportionally altering the position of a pointer; the deflection of a needle also alters the position of a dial slightly up or down. The action of the near and remote telegraphic instrument is equalized by diverting from the former a proportion of the current equivalent to the loss by leakage from the latter, which is returned into the main current beyond the near instrument. Each may be the near or remote instrument.

Part P.—A printing telegraph acting by the blow of a hammer. The escapement described in Part D. works the type wheel; the hammer is vertical and nearly in equilibrium, so that it is only fully released from the magnet when the sixteenth of a second is allowed to elapse between two symbols, then however its tail releases clockwork printing machinery, which raises the hammer for another blow during its revolution.

Part Q.—The adaptation of recording mechanism to the keys or buttons of electric telegraphs. On the keys being pressed down, they make a prick on paper placed on rollers, which, on the raising of the key, are made to bring forward a new surface of paper for the next prick by means of levers, springs, and a click and click wheel.

[Printed, 3s. 6d. See Repertory of Arts, vol. 13 (*enlarged series*), pp. 1 and 20; Mechanics' Magazine, vol. 47, p. 41; and Patent Journal, vol. 3, p. 105.]

A.D. 1847, January 11.—N° 11,524.

GAMBLE, DOUGLAS PITT.—" Improvements in electric tele-
" graphs."

[No Specification enrolled.]

A.D. 1847, February 11.—N° 11,576.

BRETT, ALFRED, and LITTLE, GEORGE.—" Improvements in " electric telegraphs, and in the arrangements and apparatus to be " used therein and therewith, part of which improvements are also " applicable to timekeepers and other useful purposes," consisting " of:—

1st. A signal apparatus. A " partially magnetised ring or piece " of metal " is deflected by a fixed coil, whose axis is parallel to that of the magnet, and at right angles to its plane of motion; the Drawings show a ring with a piece cut out, the poles being near the vacancy, also a V-shaped magnet. In one instance, one of two pointers is raised from an inclined to a nearly vertical position, the ring raising one or other of them, according to its direction of deflection, by a counterbalance lever and pins; when the current ceases the weighted pointer again assumes its inclined position. One coil between two magnets, or one magnet between two coils may be used. In a second arrangement, the coils are at right angles to the dial plate, and a ball on an arm fixed to the magnet is deflected either up or down. In a third arrangement, one vertical indicator or pointer attached to the magnet is deflected. In a fourth arrangement, two horizontal pointers (each mounted on a magnetised ring, and connected with separate coils) rise and point respectively to a circle and a dot. A method of signalling with the double pointer telegraph is detailed, consisting of combining the motions of the pointers to form one signal; also a method of working the telegraph by one handle, in which battery connection is made by a pin with a fork and insulated steel points in either direction, according to the motion of the handle from a central position, at the same time that it is broken with the line circuit, to admit the battery, by steel points and springs; the springs also keep the handle central when not in use, and the line circuit closed to receive signals.

2nd. An alarum arrangement. The deflection of a magnetised ring by a coil releases the pin of a suspended detent from a fly-vane,

and thus enables clockwork to sound the alarum; a wheel has pins in it which actuate the bell hammer until the detent is allowed to again stop the fly-vane by a notched wheel. A handle for this apparatus is on a similar plan to that for the telegraph, it is, however, only moved in one direction.

3rd. A lightning conductor, to prevent atmospheric electricity damaging the telegraph instruments. A metal hemisphere, attached to the telegraph circuit, is adjustable by means of a screw and nut so that it may be readily placed nearly touching a similar hemisphere in connection with the earth; a number of points not quite touching the telegraph circuit convey away any extra discharge.

4th. Insulating and stretching the line wires. Bell shaped insulators are used, into which the support is fastened with non-conducting cement; the line wire passes through a hole in the top, and is stretched by a pulley, ratchet-wheel, and click, temporarily fastened by a "spring ring" and screw to a flat part of the insulator.

5th. A "deflector" for turning off an instrument from the circuit, or changing the line of communication. A handle (connected with the "down line" or long line circuit) can be moved on an axis against springs so as to be either in connection with the earth-plate or with the "up line" or telegraph circuit. This is shown applied to an ordinary line of communication with a battery at each station, and one line wire; to a line with only one battery at the principal station, and three line wires; and to a line with batteries and earth-plates at each station, and one line wire. This last plan enables messages to be transmitted only to certain stations according as the telegraph instruments are included in the circuit or not, and several places on a long telegraph line may communicate differently at one time by means of the earth-plates.

6th. An "hydraulic battery." A sand battery of copper and zinc is fixed in a frame or stand, between a supply trough and a receiving trough; the supply trough drops the exciting fluid by as many "cones" as cells into the battery, which again drops the same quantity of liquid into the receiving trough. The plates are shown in a divided trough, or separate cells of copper may be mounted in a framework. A supply cistern may be used, in connection with a perforated tube filled with sponge, when a long, continuous, and undisturbed supply is required.

7th. The application of the magnetised ring and coil, as in the

1st improvement, to timekeepers. The ring or coil is fixed to the pendulum, which on the passage of the current moves before the coil or ring fixed to the clockwork frame, thus giving motion to the clock train. The circuit is made and broken by a lever which is pushed over a conductor and non-conductor alternately by the vibration of the pendulum.

[Printed, 7s. 9d. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 357; Mechanics' Magazine, vol. 46, p. 20, also vol. 47, p. 185; Artizan, vol. 5, pp. 201 and 275; Patent Journal, vol. 3, pp. 265, 282, 310, and 341; and Engineers' and Architects' Journal, vol. 10, p. 294.]

A.D. 1847, February 19.—N° 11,584.

BAIN, ALEXANDER.—" Improvements in clocks and timekeepers, " and in apparatus connected therewith," consisting of:—

1st. Giving motion to electric clock pendulums by permanent magnets on the pendulum vibrating into fixed coils.

2nd. " Working clocks and timekeepers by means of magnetic " balances acted upon by means of electric currents." A permanently magnetic balance-wheel passes through coils, the currents through which are reversed, either by a projecting pin sliding a knee'd bar to and fro in agate cups inlaid with gold, or by a spring pressing against an inlaid disc moved by an arm at each vibration of the balance. In this arrangement " a spring and regulating " curb " is employed.

3rd. Constructing the "'breaks'" or "'sliding bars'" of electric clocks. The " gold ends " or points of the wires project above the non-conducting support; the bar has a V-shaped portion which slides over them and completes and breaks the circuit as desired, the end of the bar being " on a different level " for that purpose.

4th. A " mode of effecting the 'striking,' " in electric and other clocks, from the minute hand and hour hand arbors. At the hour, a pin, projecting from the surface of a wheel on the minute hand arbor, causes the hammer arm to strike One, and at the same time releases a toothed segment (working by a clawker attached to the pendulum crutch), so as to allow its spring to press its tail against a snail-wheel on the hour hand arbor. According to the number of teeth the segment is thus advanced, is the hour struck on the bell; the first stroke always being made by the pin, which, at the same time, places the segment in the proper position for striking the remainder.

Methods of "making and breaking electric circuits so as to give "motion to striking apparatus situated at a distance," are also described and shown. The click of the segment, in the above striking machinery, always completes the circuit with an insulated "metal pointer," except at each bell stroke, when the click (being fixed to the hammer arm) is risen out of contact; at each time the contact is broken, the position of a distant "magnetic wheel" passing through coils (See 2nd head) is changed, thus releasing a lever from the hammer arm, and allowing its spring to force it against the bell. In another striking apparatus, the hammer arm is fixed to the "magnetic wheel," which strikes the bell on the completion of the circuit. Either striking apparatus may be used with any suitable mode of completing the circuit.

5th. Employing magnetic wheels to wind up clocks, &c. A magnetic wheel is kept oscillating by means of coils, a sliding bar break, and a reacting spring, which motion rotates a click wheel (on a separate axis) connected with the winding-up motion by bevil gear; or two magnetic wheels work the winding-up gear by means of connecting rods and cranks.

6th. Moving clocks, &c., "by means of currents of aeriform "fluid."

7th. Acting upon "striking apparatus, in connection with "clocks and timekeepers by means of currents of ariform" [aeriform?] "fluid."

8th. "Setting to time clocks and timekeepers by means of apparatus by which the rays of the sun are caused to act upon a "'thermo-electric pile.'" A thermo-electric pile is acted upon by the sun, at any desired hour of the day, by means of a slotted plate (or lens), which admits the rays of the sun only at the time desired, it having a motion to obtain "'equated time'" throughout the year by a lever and "excentric" wheel. The electric current thus generated passes through coils and deflects a magnetic wheel, thereby allowing certain levers to fall against a pin on the minute hand, and adjust it to the hour; the levers are risen to their former position by the clock train, just before the hour.

9th. "Setting to time clocks and timekeepers" "by means of "suitable electrical apparatus brought into action by the influence "of the sun's rays on mercury." Three tubes containing mercury are used; by elevating the comparative temperature of the middle tube, the sun's heat expands the mercury, so as to complete the

circuit at the desired time (See 8th head). The fluctuations of atmospheric temperature are compensated by having the battery wire supported by a bar whose ends float in the outer mercury tubes.

10th. "Setting clocks and timekeepers to time by means of the "falling of a ball or time signal." A "converted india-rubber" ball, inflated with air, falls upon a sliding ring, thus depressing a bent lever and completing the electric circuit.

11th. "Setting to time clocks and timekeepers" by electric currents brought into action by "a clock or other timekeeper in motion." A lever, in connection with one terminal wire, has three projections in a straight line, which can only fall into notches (respectively on the hours', minutes', and seconds' wheels) when they are in a straight line; at the hour desired, however, they are so (the seconds' wheel being the last which has hold on a projection), and the circuit is completed by the falling of the lever on an insulated metal point in connection with the other terminal wire.

12th. A mode of keeping up the supply of liquid to clock batteries. A reservoir over the battery has openings at the bottom through which the liquid cannot flow unless an aperture at the top is open to admit air; this is closed, when the battery is acting properly, by a plug at the end of a weighted magnetic needle deflected by the current; when, however, the current declines, the needle removes the plug.

13th. Keeping up the supply of liquid to clock batteries by forming the battery trough in connection with a supply vessel "in "the manner of a common fountain bird-glass;" or by inverting "one vessel filled with the required liquid" "within another "containing the plates."

[Printed, 5s.]

A.D. 1847, March 2.—N° 11,604.

CROSSE, Andrew.—"Improvements in treating fermentable "and other liquids," which refer to the application of "electric "action to extract or separate impurities or matters from fermentable, fermented, and other liquids."

Into an open or closed vessel containing the liquid to be operated upon, are placed two "porous tubes," open to the air at the top, and filled with water, one containing one or more cylinders of zinc, and the other containing one or more cylinders or coils of iron;

these are connected by strips of metal, and the electric current thus generated enables the acid and alkaline impurities to be collected in these porous tubes respectively. It is sometimes necessary to change the water. This process is said to prevent a fermented liquid from becoming "acid" or "sour." It may be employed either before, during, or after fermentation, but in the case of beer it is "best applied after fermentation;" it may also be applied to water, and when sea water is to be purified it should be distilled once before using this process. If the liquid is very impure it is beneficial to pass it "through calico or other bags" before operating by electric action. The process should be continued until the degree of attenuation or of purity is attained, as ascertained "by tasting or otherwise testing."

[Printed, 5d. See Repertory of Arts, vol. 10 (*enlarged series*), p. 231; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 196; and Patent Journal, vol. 3, p. 380.]

A.D. 1847, March 23.—N° 11,632.

LYONS, Morris, and MILLWARD, William.—1st. "Manufacturing alloys of copper with platina and palladium" by fusion and a flux.

2nd. "Adding compounds of sulphur or carbon" (bisulphuret of carbon is preferred) to cyanide solutions of the metals employed in electro-deposition, to enable a weak electric current to be used, and a bright deposited surface to be produced.

3rd. "Producing designs, sunk and in relief, in certain metals," by electro-deposition. If the article be of copper, or an alloy of copper, it is "coated all over thinly with silver or with gold by "electro-deposition," the figure drawn with copal varnish, the article immersed "in a solution of cyanide of potassium" "in "connection with electric currents till the coating metal has been "removed," then immersed in a solution of nitrate or sulphate of silver or perchloride of iron till the copper or other surface has been sunk to the required depth, thus producing a design in relief. If a sunken design is required, the design is first painted in copal varnish, the other portions are electro-silvered or electro-gilt, the varnish is washed off with turpentine or caustic potash, and the article immersed in nitrate of silver solution till the desired depth of engraving has been obtained. By exactly similar means surfaces of iron, steel, Britannia metal, type metal, and zinc may

have relief or sunken designs produced in them, a coating of copper (electro-deposited from a "cyanide of potash" solution) being preferably employed to gilding or silvering, and sulphate or nitrate of copper being used instead of nitrate of silver. Also, surfaces of gold, silver, copper, or their alloys may have designs produced in them, in an exactly similar manner, by an electro-coat of iron deposited from a solution of muriate or sulphate of iron, and using dilute muriatic or sulphuric acid, with or without electricity, to dissolve the iron. The surfaces thus acted on may have the sunken parts partially or wholly filled up with other metals by electro-deposition, the other portions of the surface being stopped out.

[Printed, 4*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 113; and Patent Journal, vol. 3, p. 482.]

A.D. 1847, March 23.—N° 11,634.

HATCHER, William Henry.—" Improvements in electric " telegraphs, and in apparatus connected therewith, and also in " electric clocks and timekeepers," consisting of:—

1st. Using "a permanent magnet in conjunction with voltaic " magnets, for the purpose of giving visible or audible signals."

The visible signals are given by the step-by-step rotation of a hand or hands produced by the deflection of a permanent bar magnet from a central position to one or other of two horseshoe electro-magnets, according to the direction of the electric current, the electro-magnets being so coiled that dissimilar poles are opposite; the permanent magnet is brought back to the central position, on the ceasing of the current, by springs. The deflection is made to actuate the pointer by means of "drivers" on the oscillating axis, working into catch wheels fixed in opposite directions on the pointer axis; on the deflection of the magnet in one direction, one driver constantly rotates the pointer in a certain direction; but on the opposite deflection taking place, the pointer is rotated in the opposite direction by the other driver, thus obviating the necessity for moving the pointer nearly a revolution to the preceding symbol. Two pointers (one to each catch wheel) may be used by having the axis of one pass through the tubular axis of the other.

When large heavy hands are to be used they are rotated by independent mechanism. Two trains are actuated in opposite direc-

tions by a "French spring barrel;" the pointer is mounted on an independent axis carrying a "star wheel," which is rotated by the pins of the "scape wheels" of the trains in either direction, according to the train set free by the electro-magnet. The deflection of the permanent magnet sets free either train, according to its direction, by means of chains and levers connected to the "scape wheel" pallets. Two pointers can be adapted to this plan by establishing the connection between the train and the index by means of ordinary spur wheels and pinions, and letting one axis pass through the other.

Audible signals, from bells of different tones, according to the pointer in motion, are adapted to the latter signal apparatus by enabling letting-off hammers to release centrifugal hammers (See N° 10,655), one to each bell, by the action of the electro-magnet on the permanent magnet. The letting-off hammers release the centrifugal hammers by falling against a detaining spring, and are again raised to their quiescent position by pins on wheels of the respective trains; the trains give motion to the centrifugal hammers when released. Or a hammer lever is attached to the magnet's axis, which strikes one of two bells, according to the direction of deflection.

2nd. A "rheotome, or rheopeter," or apparatus for breaking and completing any electric circuit at pleasure, or for reversing or diverting the direction of the current. An hermetically sealed glass tube, containing mercury, with the air expelled, has platinum wires, connected with the battery circuit, sealed into it; by the inclining of the tube the circuit is completed, or (by two tubes) the current reversed or diverted. This improvement is shown applied to the pendulum of an electric clock (See N° 9745), by pivoting the tube so that it may tumble over against stops at certain positions of the pendulum.

3rd. Arranging electro-induction apparatus for telegraphic purposes, either by the action of a primary and local battery current, or by means of a permanent magnet.

In the first arrangement, a battery, primary and secondary coil, and *U*-shaped soft iron core, are employed. The secondary current generated by the *breaking* of the primary or local circuit is alone transmitted along the line wire, as the line wire circuit does not include the secondary circuit until after the primary circuit is completed. Stirrups, on the keys of the primary circuit, do not raise

levers that complete a short circuit for receiving signals and excluding the secondary circuit from the line wire, until after the primary circuit has been completed; also the stirrups do not again close the secondary circuit until after the primary circuit has been broken. If it is desired to let the reverse but weak secondary current, generated on the completion of the primary circuit, proceed through the line wire to deprive the voltaic magnets of the instruments of residual magnetism, it is only necessary to so arrange the stirrup that it shall open the secondary circuit to the line wire before the primary circuit is completed. To enable the primary, and therefore the secondary, current to be sent in either direction two finger keys are used.

In the second arrangement, a permanent magnet induces an electric current on breaking contact between the poles of the magnet and the soft iron cores of coils; these coils can be lifted by handles arranged with stirrups, studs, and springs, in a similar manner to the finger-keys of the secondary coil arrangement above described.

4th. Adjusting clocks or timekeepers to time by electricity. An electro-magnet is mounted with its poles exactly behind XII., so that when the circuit is completed by the governing clock it attracts the iron or steel minute hand to the proper time. It is proposed for the governing clock to complete a primary or local circuit by a pin on the minutes' or the hours' wheel causing a spring to dip into a mercury cup; when the minute hand points to XII., the spring is released and the secondary current is transmitted through the coils of the distant electro-magnets. A closed tube with mercury, as in the second improvement, may be used instead of a spring.

[Printed, 3*s*. 2*d*. See Mechanics' Magazine, vol. 47, p. 357; and Patent Journal, vol. 3, pp. 452 and 474.]

A.D. 1847, June 22.—N° 11,762.

RUTTER, John Obadiah Newell.—Employing electricity to give alarm, in cases of fire and burglary, at any distance from the place of danger.

To give alarm of fire, the galvanic current is made to traverse a "constant or differential thermometer" when the mercury in it indicates a dangerous temperature, but not at other times; for this purpose two platinum or other suitable wires are sealed

into the thermometer tube, so that at a dangerous temperature the mercury completes the electric circuit, but not else. These wires are in electric connection with a galvanic battery; a galvanometer, alarm bell apparatus, and electro-magnetic coil are also included in the circuit. Several thermometers properly fitted with wires are placed in all important parts of the house and the alarm apparatus in the master's sleeping room, thus enabling any serious increase of temperature to be instantly known. When the circuit is completed, the coil (by the induced magnetism) detaches a soft iron bar from a permanent magnet, which, falling upon the detent of a spring or other alarum puts it into action and at the same time deflects the galvanometer needle. Several galvanometers may be used, each in connection with a separate thermometer, to show the dangerous locality.

The same alarm apparatus is used to give notice of burglary, but the current proceeds through the galvanometer in the reverse direction to that giving alarm of fire, thus deflecting the needle in the opposite direction. The needle may thus point to an F for "'fire,'" and to a "'B'" for burglars. The doors and windows are made the means of protection, and the electric circuit is completed by a platinum wire moving in a tube open at the top, influenced by the movement of the door or window; the tubes are partially filled with mercury in constant connection with one battery pole. In sash windows the circuit is completed by sash lines interwoven with metallic wire, brass plates and knobs are fixed in the "rabbit" of the frame, or a ball falls into an aperture when the door or window is opened, thus completing the circuit.

By analogous means, intelligence of fire or trespass in any part of vessels, docks, warehouses, mines, &c., of the temperature of bodies in chemical processes or conservatories, and "of the temperature "or pressure of steam in steam boilers," &c., may be conveyed.

Conveying intelligence on railway trains, between the guard and driver (for instance), by means of galvanic shocks. For this purpose two properly insulated conducting wires are laid along each carriage and properly connected by flexible wire cords having suitable hooks and rings. An electro-magnetic coil, as used to give shocks, and a galvanic battery are placed near the guard's seat, and the signal is conveyed to the engine driver by a leather strap with metallic knobs on which his hand is usually placed, or other convenient means; the shock, or series of shocks

received by him, on battery connection by the guard, being the signal conveyed.

[Printed, 10d. See Mechanics' Magazine, vol. 48, p. 86; and Practical Mechanics' Journal, vol. 3, pp. 167 and 189.]

A.D. 1847, June 23.—Nº 11,765.

MAPPLE, HENRY, BROWN, WILLIAM, and MAPPLE, JAMES LODGE.—" Improvements in communicating intelligence " by means of electricity, and in apparatus relating thereto, parts " of which improvements are also applicable to other like pur- " poses," consisting of:—

1st. A method " of arranging a magnetised steel disc or plate, " within an electric or galvanic coil," to give motion by its deflection to the above-mentioned apparatus. A magnetised disc is mounted on an axis and placed in a coil, the axis being at right angles to the axis of the coil. This is applied to release the striking part of a clock at the top of a telegraph signal instrument; the deflection of the disc axis causes a " locking piece " to be interposed between an arm vibrating with the pendulum and a " lifting piece," whose tail then lifts the " rackhook " every vibration of the pendulum, until the locking piece returns to rest by the ceasing of the current. The disc and coil are also used to deflect a pointer on the disc axis in a double vibrating or oscillating pointer telegraph.

2nd. " Employing a magnetised disc or plate of steel in com- " bination with an electro-magnet." A clock train is fitted with a lever escapement without a balance spring, the balance-wheel is, however, magnetised, and is worked by an electro-magnet; the pointer, being placed on the escape-wheel axis, can be made to indicate any required letter on a circular dial; the "pole changer" used for this signal apparatus, consists of a spindle carrying insulated pins which make the requisite connections with fixed springs according as the handle is moved right or left. Two other applications of the above method to giving signals by driving escapements are described and shown; in one, a circular plate with a flat bevelled edge works two escape-wheels; and in the other a circular motion of the pointer in either direction is obtained by continually deflecting the disc in one direction or the other, according to the direction it is desired to rotate the pointer. This method is also applied to releasing the clockwork of musical

boxes; and by means of a "permanent keep" (to prevent "the "prejudicial effect of residual electricity") a double vibrating pointer telegraph is worked by the disc and electro-magnet. Lastly, a vibrating pointer telegraph is actuated by a magnetised ring surrounding a coil.

3rd. A step-by-step telegraph, in which the pointer may, at any time, be moved back to the starting point. The pointer is fixed on the axis of a toothed segment having a counterbalance weight; two electro-magnets act on magnetised discs having clicks working into the toothed segment, the one electro-magnet thus moves the pointer in one direction or the other, the other electro-magnet enables it to come back to zero. In another plan, magnets move over the poles of electro-magnets, thereby releasing clicks and moving the pointer as in the above telegraph; in this arrangement, however, only one direction of the current is used, the parts being returned to their original position by springs; the steel permanent magnet (or soft iron) is "a portion of a ring." In a third plan, two magnetised circular plates having "a cut made half way through "them," and fixed so "that their poles are not over or opposite to "each other," are made to work a pallet wheel as above, by pallets on one shaft, when the current is sent in one direction round an electro-magnet; when the current traverses in the other direction it releases a roller from the wheel and enables the pointer to come to zero.

[Printed, 2s. 6d. See Repertory of Arts, vol. 11 (*enlarged series*), p. 65.]

A.D. 1847, July 3.—N° 11,776.

WEARE, Robert.—"Improvements in clocks or time-keepers," consisting of various applications "of magnetism and electricity "to the vibrations of a balance, and also a pendulum;" as follows:—

1st. The balance is made of "two semicircular permanent steel "magnets," with their similar poles facing each other; a cylindrical coil of insulated copper wire, having the magnets of the balance free to move through its axis, has an electric current passing through it, which causes the balance to vibrate in one direction or its opposite according to the direction of the current, that direction being properly changed by wires projecting from the balance "axis" completing the circuit on an inlaid disc alternately in opposite directions. "A spiral spring," fixed to "the balance

"staff" at one end, and to the "back plate" of the clock at the other, regulates the time, and counteracts "the power of the coil "upon the opposite poles of the balance."

Two methods of generating "the electric fluid required to keep "the clockwork in motion" are set forth; one in which copper and perforated amalgamated zinc plates are placed horizontally in a vessel containing "chloride of calcium," "sponge," and "sand" between the plates; a second in which "common gas coke" and amalgamated zinc plates are placed uprightly in the earth.

2nd. A balance is made to vibrate by means of a magnetic needle fixed upon its axis passing through a galvanometer coil. The vibration is kept up by connection of the coil with the battery being made and broken at suitable intervals. A spring fixed on the balance staff moves "the balance in the contrary direction to "the magnetic coil."

3rd. "An electro bar magnet" on the balance staff, in connection with a fixed permanent magnet, enables the balance to vibrate. The bar is magnetized by the electric current only when opposite the poles of the permanent magnet, which then repels it and breaks the electric current. The bar (assisted by a spring) is then attracted towards the permanent magnet by induced magnetism, thus producing vibration of the balance.

4th. Giving motion to a pendulum by means of "an electro "bar magnet" "fixed to the bottom of the pendulum rod," which is attracted by the poles of a permanent magnet, except when at the extremity of its vibration, it being then magnetized so that its poles repel those of the permanent magnet.

5th. Giving motion to a balance by means of "a dry pile" composed "of plumbago, zinc, and paper." "A glass rod" on the balance staff has a small gilt bulb which gives motion to the balance by vibrating between the opposite poles of the pile.

6th. Giving motion to a pendulum by means of a dry pile. The bottom of the pendulum rod carries a glass arm with a gilt bulb which vibrates between the poles of the pile.

7th. "Obtaining motion to the balance axis" by a permanent or electro horseshoe magnet, which is turned by means of a "lever," "collett," "roller," and "pin" in the roller, at each attraction of a magnetic needle, so as to repel the pole which was before attracted. A single pole of a permanent magnet may act by attraction only.

8th. The application of magnets to the vibration of a pendulum carrying a magnetic bar. The pendulum rod strikes against levers (at the extremity of its arc) that alter the position of the magnets, as in the 7th improvement.

The vibrations of the balance or pendulum caused by either of the above methods, may be used to give "motion to the works of "a clock" by means of a pin on the balance staff, or of the pallets of the pendulum, "showing a second to every vibration."

[Printed, 1*s*. 8*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 129; and Patent Journal, vol. 4, p. 175.]

A.D. 1847, July 3.—N° 11,783.

STAITE, William Edwards.—"Certain improvements in "lighting, and in the apparatus or apparatuses connected there-"with," consisting of:—

1st. Constructing electric light apparatus so as to give the lower electrode a rotary motion at the same time as a vertical motion. The lower electrode holder has a long screw cut on its lower portion, which is also mounted with a cross piece working in the slot of a slotted tube. Motion is given to the lower electrode by clockwork, which is liberated only when the electric current is greater or less than an average amount by the soft iron core of a coil in the circuit; for this purpose, the shaft of two crown pinions in the clockwork train rests upon the core, and their crown wheel is thereby rotated, in one direction or its opposite, whenever the core rises above or falls below a given space, the crown pinions being at a greater distance apart than the diameter of the crown wheel. An endless screw on the crown wheel axis gives rotary motion to the slotted tube, in which the screwed end of the lower electrode holder is free to move up or down when motion is given to the tube; a nut made fast to the framing causes the electrode holder to rise or fall according to the direction of its rotation. The soft iron core is adjustable to the electric power used by means of weights.

2nd. The application of melted sugar to a mixture of coal and "Churk's" [Church's?] patent coke (See N° 11,010?) for manufacturing carbon electrodes. The coal and coke is mixed, pulverized, heavily pressed and heated in wrought iron moulds, plunged whilst hot into melted sugar, and heated and plunged into melted sugar alternately, as often as may be thought requisite.

3rd. The application of currents of electricity to light up or extinguish signal lamps. A fine platinum wire lights the wick of the lamp on being heated by the passage of the electric current; and on the removal of the detent of a clockwork escapement by an electro-magnet an extinguisher at the end of a lever is depressed over the light.

[Printed, 2*s*. 9*d*. See Repertory of Arts, vol. 12 (*enlarged series*), p. 145; London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 396; Mechanics' Magazine, vol. 48, p. 49; Patent Journal, vol. 4, p. 169; and Engineers' and Architects' Journal, vol. 11, p. 49.]

A.D. 1847, August 3.—Nº 11,828.

FLETCHER, THEODORE.—"An improved manufacture of "speculums for various purposes."

This invention consists "in coating the backs of glasses which "have been quicked or silvered, as it is called, for the purpose of "speculums, such as mirrors, looking glasses, or reflectors, with "metal by means of the process called electro-plating, whereby "great protection from injury is afforded to the quicksilver of the "speculums, and a much stronger power of reflecting light given "to the speculum."

The process is as follows:—The silvered glass plate is carefully varnished over with a mixture of "shell-lac, spirits of wine, and "lamp black;" whilst the varnish is still "tacky," "finely "powdered blacklead, or black oxide of manganeese, or other "metallic oxides or powders" are shaken "over it from a fine "muslin bag;" it is then covered "with leaf metal," the plate submitted "to any of the ordinary electro-plating processes," and a "coating of copper" (preferably) thereby precipitated "over the "entire back of the plate."

Speculums may be submitted "to the process of electro-plating "on the back," or covered "with metal by means of electricity in "any of its various forms arranged for the purpose."

[Printed, 3*d*. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 115; Patent Journal, vol. 4, p. 295; and Engineers' and Architects' Journal, vol. 11, p. 115.]

A.D. 1847, September 2.—Nº 11,849.

WARD, WILLIAM SYKES.—Various "improvements in communi-"cating motive power" by mechanical means, applicable to working railway signals and breaks, are set forth.

"Improvements in communicating intelligence by the agency "of voltaic electricity." Signals are indicated by the deflection of electro-dynamic coils, free to vibrate over the poles of fixed horse-shoe permanent magnets, the axis of the coil being coincident with the axis of the magnet; two coils are used in the same circuit, and by means of stops one coil only is deflected to each direction of the electric current. Methods of mounting the coils, the arrangement of the alphabet, and a spring keyboard, are set forth in detail.

Improvements in revolving pointer and dial telegraphs. Whenever the electric circuit is completed or broken, the armature of an electro-magnet is attracted or sprung back, thereby giving motion to a "pallett" and pallet wheel; a coil passing round the poles of a permanent magnet (as above) is at the same time deflected so as to indicate the outer or inner circle of letters on the dial, or to stop and adjust the pointer by a projecting arm, according to the direction and frequency of continuous deflection. A bell may be rung by a local circuit; two strips of metal (one attached to the coil, the other to the pointer axis) conjointly complete the circuit.

Communicating signals on railways. A disc is so arranged, by the motion of a weight or spring (to be occasionally wound up) acting on cranks, as to turn half round and return back again, when permitted so to do by certain catches; one catch acts by a spring when no signal is made, the two others are brought into action and the spring catch released by electro-magnets excited by a local circuit, including one or the other electro-magnet, according to the direction of deflection of coils (as above) by the long circuit. This apparatus may be applied to a semaphore signal with moveable arms. When the signal is worked, it may convey a counter signal, by striking against a spring, and momentarily interrupting the circuit.

[Printed, 2s. 1d. See Repertory of Arts, vol. 11 (*enlarged series*), p. 223; and Patent Journal, vol. 4, p. 402.]

A.D. 1847, September 9.—N° 11,858.

ROBERTSON, Joseph Clinton.—This invention, entitled "Certain improvements in the manufacture of metals from their ores," consists of the application of electricity to the ores in a fused state, to separate from them "sulphur, phosphorus, arsenic, "and other volatizable matters" which proceed "to the electro-"positive pole" of the battery.

A furnace or kiln, similar to "an ordinary lime-kiln," formed of non-conducting and heat-resisting materials, has alternate layers of fuel (coke preferred) and ore laid upon the iron grate bars, and an "iron ring or cross" laid "on the middle "of the topmost layer;" the undermost layer of fuel is kindled, and, as soon as the mass is moderately ignited, the iron ring and the grate bars are respectively connected with opposite poles of a galvanic battery, or other source of electricity. "The lowest and best calcined portions of the mass are to be "drawn off from time to time," and the "furnace must be re-"plenished from the top" in proportion. The ore "is then to be "washed and reduced, either in retorts by concentration, or in a "blast furnace according to the modes in ordinary use."

[Printed, 3d. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 201; Mechanics' Magazine, vol. 48, p. 260; and Patent Journal, vol. 4, p. 482.]

A.D. 1847, September 30.—N° 11,878.

DE LA SALZEDE, CHARLES.—"Improvements in brassing and "bronzing the surfaces of steel, iron, zinc, lead, and tin."

Electro-brassing and electro-bronzing the above-mentioned surfaces by means of aqueous solutions of chemical salts.

A solution for brassing is described, containing "sub-carbonate "of potash," chloride of copper, sulphate of zinc, "azotate" [nitrate?], of ammonium, and cyanide of potassium, in certain proportions; this solution is to be "kept for about five hours "under the action of a battery with a rapid current (like that "of Bunsen, of Groves, of Daniel)," and at a temperature of 77° Fahrenheit.

Another solution for brassing is described, containing "sub-"carbonate of potash," chloride of copper, sulphate of zinc, and cyanide of potassium, in certain proportions; this bath is to be subjected cold to voltaic action for the same time as the former solution. A brass "electrode" or dissolving plate is used with these brassing solutions.

In electro-bronzing, chloride of tin is used instead of sulphate of zinc, and a bronze "electrode" or dissolving plate is employed.

"In either of the processes before described," instead of "the "sulphate of zinc or chloride of tin, any neutral salts and" [of?] "zinc or tin acids may be employed," and "neutral salts or acids, "so long as the bath is sufficiently rich in potash, that there may "be no action upon the blue paper of turnsol" [litmus?].

"The proportions of the salts of copper, or of tin or zinc, may be "varied according to the shade of color required for the article "to be covered."

These processes may also be applied to coating "other metal, "such as alloys of metals, or when alloyed with bismuth and "antimony."

[Printed, 5*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 298; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 260; Patent Journal, vol. 4, p. 565; and Engineers' and Architects' Journal, vol. 11, p. 169.]

A.D. 1847, October 7.—N° 11,886.

BAIN, ALEXANDER.—1st. "Arranging wind musical instruments "together with apparatus in such manner that by the passage of "perforated surfaces the notes of the instruments may be per- "mitted to sound in such order as may be desired to produce a "given tune." In an instrument with "metal spring tongues," the openings above the several notes, which permit the air from the wind chest to vibrate the springs, are opened and closed, so as to produce the required melody by the passage of perforated paper or other suitable surface over them, the paper being so arranged on rollers as to be drawn "over the perforated "cover" "of the several chambers." The notes will only sound when a perforation in the paper comes over an opening in the cover, and the width and situation of the perforations will determine the duration and tone of each note.

2nd. "Playing on several musical instruments simultaneously "by means of electro-magnetic apparatus intervened between the "instruments." In a keyed instrument, each key, on being struck, brings into contact two pieces of metal, connected with the battery and with a "temporary magnet" over the key of a similar note, in as many musical instruments as may be desired to be played at once. In being attracted to the poles of the temporary magnet the keeper also strikes the key over which it is placed. This invention may be adapted to the perforated surfaces of a self-acting apparatus, by having a spring and stud for each note connected with the battery, and kept apart from the other pole by the paper, except where the perforations are; by battery connection, electro-magnets may act on other instruments.

[Printed, 9*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 287; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 246; and Patent Journal, vol. 4, p. 621.]

A.D. 1847, October 7.—N° 11,887.

BROWN, Sir SAMUEL.—"Improvements in propelling and "steering vessels, and improvements in the mariner's compass," consisting of:—

1st. "Improvements in the construction of and manner of "working marine propellers, and other methods" "for accele- "rating the velocity of ships and vessels, more especially under "the combined agency of the sails and steam power, and at all "times diminishing the risk of striking on rocks or shoals, or "navigating in intricate channels, aided by a shoal warner."

2nd. "An important improvement in the mariner's compass, "particularly adapted for iron-built ships, by which I am enabled "to elevate it a sufficient height above the deck to be beyond the "influence of lateral or local attraction, while, by the more favourable "exposition of the points on a vertical zone, they are rendered visible "in all directions." A mariner's compass is described and shown "raised on a pillar, on the most convenient part of the deck, a "sufficient height beyond the influence of local attraction." The compass box has a glass bottom, through which by means of lamps in the compass box, the image of the compass card is thrown on to a mirror mounted on a pedestal; the helmsman views the reflected compass card and steers thereby. The needle is "sus- "pended under the pivot point," on a cone, and the compass card is made in the form of a hollow cylinder, round the circumference of which the points of the compass are marked, so that the card can be seen at a distance through openings in the side of the compass box by means of the lamps. "A circular hollow rim "inside of the compass box" contains oil for the lamps, and is fitted with suitable pipes and cocks, connected with the lamps through a circular opening in the upper part of the compass card. The pillar supporting the compass is jointed, in order to lower the compass to trim the light.

[Printed, 3s. 3d.]

A.D. 1847, October 7.—N° 11,894.

DUJARDIN, PIERRE ANTOINE JOSEPH.—"Improvements in "electro-magnetic telegraphic apparatus," consisting of:—

1st. An apparatus for producing audible signals. "A long but "thin rectangular permanent magnet" is supported on a centre,

so that one of its poles may oscillate in a horizontal plane between the poles of an electro-magnet; on its deflection by the poles of the excited electro-magnet, its other pole strikes a glass bell; either a block of wood and a glass bell, or two glass bells, may be used.

2nd. An apparatus for marking "messages on paper by means "of groups of dots of ink." By means of a "long pin taking "into a forked arm," ordinary clockwork rotates a paper drum having a screw axis, under which is placed a "telegraphic pen" mounted delicately on an axis, and having an arm to which is affixed a bar permanent magnet; the pen is made to rise against the paper, out of an inkstand, by the repulsion of the permanent magnet by an electro-magnet, whenever the electric circuit is completed; the paper is placed on cylinders of thin metal which are slipped over the drum as required. Or the clockwork may merely revolve an endless band of paper on rollers, and by means of a screw, communicate lateral motion to the electro-magnet, pen, and inkstand.

The above signal apparatus may either be used with the hereinafter mentioned magneto-electric apparatus or with a galvanic battery.

3rd. Magneto-electric machines for the above-mentioned telegraphic apparatus. In one arrangement, the induction coils envelope the ends of the permanent magnets, and electricity is excited in them by suddenly removing an iron bar or armature from the magnet by a lever. In a second arrangement, coiled iron bars are placed between the permanent magnet and the armature. In a third arrangement, a plate of iron, mounted on an axis, rotates before either the coiled magnets or coiled iron bars. In connection with the latter arrangement, an alphabetical keyboard is used, which completes the circuit by means of springs pressing against wire sunk in the threads of a revolving wooden screw; or the keys raise certain rods against the insulated threads of a screw by means of plates suitably cut out and arranged in a box under the rods.

[Printed, 1s. 2d. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 402.]

A.D. 1847, October 14.—N° 11,910.

WALL, Arthur.—The title of this invention is:—"A new or "improved apparatus for and method of separating oxides from

"their compounds and each other;" and the invention relates to "the arranging of a series of magnets into an apparatus for "separating oxides of iron from other oxides and from other "matters."

"Two frames or drums" carry "an endless strap of leather or "other suitable flexible material," on whose surface "are fixed a "series of magnets," "and in connection therewith are thin iron "or steel plates," "which are split into narrow strips, and which "are turned edgewise, so as to leave spaces between them." These plates are fastened between two magnetic plates.

The ground ore is placed in a trough in which magnets move, and the oxides of iron are collected by magnets fixed over a separate portion of the trough, having similar poles opposite to the moving magnets, thereby neutralizing their action, and enabling the oxides of iron to drop into the proper receptacle.

In applying the invention to purifying copper ores, so as to leave them "in a better condition to be dealt with in manufacturing "copper," the ore is to be first roasted and ground, then submitted to the action of the magnets by which the oxides of iron are separated from other matters.

Either permanent magnets or electro-magnets may be used, but preference is given to permanent magnets.

[Printed, 9d. See Repertory of Arts, vol. 12 (*enlarged series*), p. 22; Patent Journal, vol. 4, p. 528; and Engineers' and Architects' Journal, vol. 11, p. 144.]

A.D. 1847, October 26.—N° 11,926.

PETRIE, George.—"Certain improvements in electric tele- "graphic apparatus," consisting of:—

1st. A "keyboard in which the contacts are made by springs "coming against pieces of fixed metal immersed in mercury," or *vice versâ*. Two keys complete the line-wire circuit when untouched, but admit the battery circuit in one direction or the other, according to the key depressed.

2nd. A local circuit completer. One of two separate local circuits is completed, according to the polarity of an electro-magnet in the telegraphic circuit, by the attraction of permanent magnets suspended by their similar poles on two separate axes, so as to have their free poles opposite the contrary poles of the electro-magnet. When the electro-magnet is not excited the inductive power of the permanent magnets on the electro-magnet is balanced.

3rd. A "circuit communicator," "to communicate by self "action the signal from one circuit to another." The 2nd improvement is applied to complete a branch circuit, connected with a second battery, in the same direction as the main circuit.

4th. "Communicating an intermittent revolving motion to "electric telegraphic indices." A ratchet wheel on the index axis is worked by a claw on the end of a lever whose axis is concentric with that of the ratchet wheel. The claw lever may be moved by any kind of electric means; an electro-magnet, as well as a galvanometer action, are described and shown.

5th. Releasing telegraphic clockwork by electricity. A pallet, actuated by an electro-magnet, moves in a plane parallel to the axis of a wooden cylinder, having stop pins radiating intermediately from its surface in two rows, one row being on each side of the cylinder.

6th. "A telegraphic dial plate having two revolving indices," each actuated by its own mechanism. Two concentric circles are used, one containing the numerals to 9, the other the tens to 90; each elementary signal is indicated by the position of the indices taken together, consequently 100 signals can be conveyed. The 4th or 5th improvement works the hands.

7th. A dial for conversing with the alphabet. The 6th improvement is applied to alphabetical signals by arranging the alphabet into five groups of five letters each, the short hand points to the group, the long hand to the position in the group.

In this and the last improvement each mechanism may be worked by a local circuit; or one direction of the main current may work one mechanism and the opposite direction the other.

8th. A "telegraphic governing apparatus," used in connection with a "governing circuit" to modify, control, connect, insulate, and divide other long telegraph circuits. The apparatus acts by means of intermittent currents or "shocks;" the positive shocks working the escapement, and the negative shocks preventing a second clock train, connected with the apparatus, from following the motion of the escape-wheel train. By means of a circuit completer (See 2nd head) acting on two distinct local circuits (which are further completed or interrupted by a "neutralizing wheel" and "governing wheel" respectively), and thence on a "stopper "lifting" and "detaining" magnet, a stop is placed and retained in a "determinating" wheel or not, according to the number of

movements made by the escapement by means of positive shocks, before a negative shock is sent along the governing circuit. By the above means, from a distant station, communication with any other station may be effected or cut off.

9th. Including in one circuit Bain's transmitting and recording apparatus (See N° 11,480?) and the "governing apparatus" mentioned in the 8th improvement. The circuit is divided into two portions, the weaker of which acts on the circuit completer of the governing apparatus; the other circuit passes through the "governing wheel" and into the recording apparatus. The intelligence must be transmitted by such rapid shocks that the escapement of the governing apparatus is not acted on.

10th. "A railway danger signal apparatus," to enable information of danger to be conveyed to a "station" from intermediate parts, or "local divisions," of the line of rail. A closed galvanic circuit is broken by the depression of a key at certain telegraph posts, and causes the escapement of an electro-magnet (See 5th head) to give signals according to the number of breaks made in the circuit. A movement of the pointer to the right or left refers respectively to the down and up lines of rail.

11th. "A railway progression signal apparatus." By a somewhat similar arrangement to that described in the last improvement, except that a pendant rod projecting from the telegraph post enables a rod fixed to the locomotive to break the circuit, the position and progress of a train is telegraphed, and a dial pointer made to progress accordingly. If a stoppage occurs, the circuit is kept broken, and the dial hand points to an intermediate set of red signals.

12th. "A railway safety signal apparatus," to communicate safety signals to a moving train so long as there is no obstruction on the line. A somewhat similar arrangement to that described under the 10th and 11th heads is adopted, except that an apparatus is placed in the guard's van in connection with the station through the rails, and (unless the circuit is purposely broken at the station) completing the circuit at every telegraph post.

13th. A "railway governing apparatus" for preventing collisions. "The progression and safety signal apparatus" are combined in a somewhat similar arrangement to that already described, and give the combined advantages of the two arrangements. "A speaking telegraph" is in connection with the apparatus. Two

line wires are used, so that the "safety" circuit is "half of the "progression and danger circuit."

14th. Insulating suspended telegraph wires. In a cast-iron post a wrought-iron rod is fixed, having a shoulder; over the top of the post are placed alternate covers of conducting and non-conducting material; the telegraph wire is fastened to metallic rings that rest on the non-conducting covers, and have metallic pins screwed into them so as to conduct atmospheric (but not voltaic) electricity to the earth.

[Printed, 4s. 10d.]

A.D. 1847, November 4.—N° 11,943.

DU MOTAY, Cyprien Marie Tessié.—"Improvements in "inlaying metals with various substances."

This invention consists in producing "incrusted or damaskene "work," by depositing metal. Electro-deposition is mentioned, and in most cases is preferred.

The improvements are comprised under the following heads:—

1st. Except in cases mentioned under the 11th and 12th heads, before depositing the metals intended to form the design, the design is formed in intaglio or relief upon the body of the article to be ornamented (which may be any substance upon which metals can be deposited) by any of the usual means, or by "engraving by "galvanism or electricity." To leave unprotected only certain parts of the article to be engraved, either it is covered with a varnish (See 4th head, for instance) and the portions forming the design are to be cut away, or those parts to be protected are "covered with a reserve" by a brush (as in "stencilling") or other suitable means.

2nd. "When an inlaying of one metal only is required without "employing reserves," the design having been formed as set forth under the 1st head, the article is coated with the required metal to the depth of the hollow parts of the design, and "the damaskened "surfaces are then laid bare" by grinding or otherwise removing the layer of superfluous metal.

3rd. "To surround the inlayings or devices with several parallel "lines of different metals," they are successively deposited upon the article in thicknesses proportionate to the depth to which the design is cut, and to the breadth of the line required.

4th. To damaskene in one metal with "reserves." Certain parts

of the metal are covered with "copal or oil varnish, mixed with "minium, cinnabar, pure baryte, or gamboge," or any other substance that will resist the action of the solution. "When the "intaglio parts are quite filled up by the metal deposited, it is "withdrawn from the bath," washed, the reserve cleaned off, and the surface laid bare, as set forth under the 2nd head.

5th. To damaskene in several metals by means of "reserves." All those parts not intended to receive the first deposit, are protected by any of the means set forth under the 1st and 4th heads. After the first deposit, the reserve is cleaned off and those parts not intended to be coated with the second metal are protected, and so on until all the metals have thus been deposited where required.

6th. Producing damaskenes of several metals without reserves by using devices of different depths. The first metal is deposited to the depth of the shallowest device, the next to the depth of the next shallowest device, and so on, until the whole device is completed.

7th. To produce damaskenes in relief by filling up devices in intaglio. Those parts not to be covered are protected by a "reserve," and the metal deposited thick enough to form raised designs upon the surface.

8th. Inlaid work in one metal only, is produced by depressing portions of a flat plate (previously coated with metal) according to given design, and reducing the plate again to a flat surface.

9th. Inlayings in several metals are produced by a similar means to that mentioned under the 8th head, the plate being covered with coats of different metals, and the parts of the design being depressed to various depths, according to the metal required to be seen at any particular part.

10th. Double-faced damaskenes are produced by stamping the design on a thin sheet of metal and depositing the second metal on both sides. On each side the ground will be of a different metal when the design is laid bare.

11th. Damaskenes upon another metal as a basis are obtained by coating a smooth plate with reserve where the first metal is not required, depositing the first metal, cleaning the plate, and depositing the second metal where required only.

12th. Double-faced damaskenes are produced by double deposition, by fumigating the original plate before its immersion in the

solution, to prevent the deposit adhering too firmly. By this process inlaid work in several metals is produced by means of reserves.

13th. Inlayings are produced in one or more metals by applying a plate, having the design cut through it, to a fumigated plate, and filling up the design with deposited metal.

14th. Producing "damaskenes or encrusted devices" upon non-conducting bodies, by coating them with plumbago.

15th. To produce devices to be inlaid in wood, &c., by the ordinary means. A sheet of metal, of the pattern required, is covered with various metals, and cut in cross section into thin discs, which are inlaid in the wood in the usual manner.

[Printed, 5*d.* See Repertory of Arts, vol. 12 (*enlarged series*), pp. 58 and 135; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 350; and Engineers' and Architects' Journal, vol. 11, p. 217.]

A.D. 1847, November 23.—N° 11,974.

REID, William.—1st. Insulating and protecting telegraph wires, by means of sleepers and "carriers." They are laid in "deep parallel grooves cut on the upper surface of the sleeper," non-conducting "annular supports or carriers" "are fitted into "the grooves" at suitable distances, and the vacant spaces "are "filled up with marine glue, or gutta percha, or asphalt, or Stock-"holm tar or any other resinous substance, which is poured in in "a warm and fluent state." "An iron cover or shield" "is laid "over the whole and made fast to the wood by screws," "while "the marine glue," &c., "is in a fluid state." The sleepers may be "of stone, concrete, or earthenware," when the non-conducting "annular carriers" may be dispensed with. The spaces may be left unfilled up, and "washers of gutta percha" or other suitable material may be laid "between the edges of the shield and the "sleepers" to exclude water. Or the wires may be laid in "a "square groove" in the sleeper, being "first covered with cot-"ton" and enclosed separately in lead tubes. Or the "covered "wires may be placed in tubes of iron or stone, or concrete."

Various insulators are described and shown:—A tube having a flange, screw, and nut; a tube with a plain collar and split metal ring instead of a screw and nut; a tube with a flange, slot, and pin; pairs of insulators with headpiece and screw. These are all suitable for post telegraphs, and are by preference made of earthen-

ware; the shaft of the insulator being put through a hole in the post, the screw and nut or other contrivance is tightened against the flange on the other side of the post; where pairs are used one is screwed in on the opposite side to the other. An insulator suitable for tunnels and bridges, consists of a "round" or "square" "post" of earthenware or gutta percha with "side rests," in which the wires are laid, a "roof-piece" is added; this insulator is fastened by staples to the wall. Occasionally an insulator is used, consisting of "a disc with two conical holes" "meeting in the centre," and with or without an opening to slip on the wire.

2nd. Improvements in apparatus for communicating between the guard and carriages, or the guard and engine-driver, in a railway train.

Two tubes are fixed to the top of each carriage, each tube containing "an electro-conducting rod" sustained in it by disc insulators; connection is made on placing the carriages, by a short metal tube which slips on to the ends of the "conducting rods," they being provided with springs bearing against the inside of the tube; each tube besides has "a universal joint" so as to adapt itself to the motion of the carriage, and two pendent chains, one of which is connected with the carriage, the tube is thus prevented from falling to the ground.

In the alarum apparatus a galvanometer is "employed to sound "the bell;" the permanent magnet strikes against a lever (when the electric circuit is completed), which puts in motion the alarum clockwork. It is preferred to construct the galvanometer in two parts, an upper and an under horizontal coil, the axis of the magnet (for which there is a suitable groove) passing between them.

[Printed, 1*s*. 7*d*. See Mechanics' Magazine, vol. 48, p. 516; Artizan, vol. 6, p. 159; and Patent Journal, vol. 5, p. 44.]

A.D. 1848, January 13.—N° 12,022.

MORSE, Sidney Edwards.—"Improvements in the manu-"facture of plates or surfaces for printing or embossing," consisting:—

1st. "In making the plate or surface by a new mode of com-"bining two substances, one of which is afterwards partially "destroyed or removed." The process is as follows:—A suitable copper plate is covered on the lower part (intended to receive the design) with etching ground on both sides; the drawing is made

"directly, as in ordinary pen-and-ink writing or drawing upon "paper;" the plate is immersed in a weak solution of pernitrate of mercury and rinsed; copper is then electro-deposited in the exposed metallic parts, being prevented from adhering too strongly by the mercurial coating previously given; the plate is taken out of the solution before the copper lines become too broad for the proper effect, rinsed, and again immersed in the mercurial solution, rinsed, and *dried;* a rim, cut out of pasteboard, is placed on each side of the copper plate and backed with a mahogany block, thus enabling fusible metal to be run on the back (to heat the plate) and then on the front of the plate; the deposited copper will be found attached to the fusible metal which forms the printing plate, but easily detached from the original copper plate; the intervening alloy is partially removed or sunk by acids, and, if necessary, by friction.

2nd. "In a new mode of forming the cavities or sunken parts "of the surface." After drying the plate, in the first process, instead of immediately placing the rims and mahogany block, the heated plate and deposited copper is spread over with an even coat of fused chloride of zinc, which is allowed partially to deliquesce; the rims and blocks are placed, and the fusible metal cast in them. The result of this process is a fusible metal printing plate, having the copper design standing up from it, cavities being formed where required by the "chloride of zinc and the evaporation of the water "united with it."

[Printed, 4d. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 257; Artizan, vol. 6, p. 250; and Patent Journal, vol. 5, p. 235.]

A.D. 1848, January 25.—N° 12,039.

HIGHTON, Henry, and HIGHTON, Edward.—"Improvements in electric telegraphs."

1st. "Substituting horseshoe magnets for magnetic needles in "electric telegraphs." The axis of the horseshoe magnet passes between the limbs, and either perpendicular to the line joining the poles, or parallel to the limbs; in the first case, the axis of the coil is parallel to the axis of motion of the indicator; and in the second case, the axis of the coil is perpendicular to the pointer axis. Various shapes are shown of permanent magnets and coils; signal instruments, with one or two indicators, adapted to one or two line wires, that act either by pointing to the symbol, or uncovering a screen from it, are also described and shown.

2nd. "A mode of constructing and arranging keys," in which the circuits are coupled up so that each key is used only for a single sign or symbol. The number of combinations so formed is represented by $3^n - 1$ (n being the number of line wires). There are the same number of batteries as line wires. A number of parallel insulated metallic strips, resting upon springs, are disposed transversely upon the keyboard under the keys; each strip communicates with a battery pole, or with an up or down line wire (or, at the terminal stations, with the earth). Non-conducting hinged keys, with springs and suitably connected metallic pegs, press upon and connect the circuits as they are required to produce a given symbol. The keys may be arranged as pianoforte keys. An additional key is kept pressed down, and makes connection with all the down wires when the other keys are not actually being used. These keys are more especially useful in telegraphs indicating by screens, and pointing to or printing signs.

3rd. A "*perænode* or circuit completer," to complete the circuit of "secondary" or local batteries. A bar permanent magnet is hung horizontally above two vertical bar electro-magnets, and another is hung similarly beneath the electro-magnets. The coiling of the electro-magnets is such that similar poles oppose the same permanent magnet, and each permanent magnet is weighted at one end and has suitable stops, so that it can only be moved in one direction. When a line-wire current is sent through the coils of the electro-magnets, an insulated wire (at one end of the permanent magnet which is moved) dips into a mercury cup, and completes the circuit, according to the direction of the line-wire current. As one direction of the line-wire current only affects one permanent magnet, two directions of the same secondary circuit, or two separate circuits, may be completed by the same perænode.

4th. "Combining a series of screens in such manner that, being "placed one before the other they shall, by their relative positions, "changed from time to time, shew the desired signs or symbols." A number of differently perforated screens, moving independently, are oscillated or otherwise moved before another independently moving screen, on which the signals are marked in suitable positions, thus, by a combination of movements of the screens, all the signals may be given as required. It is preferred to use the 1st improvement for moving the screens, each screen having its own horseshoe permanent magnet; and to use the 2nd im-

provement to complete the circuits, as the combinations that can be formed of the screens are also expressed by $3^n - 1$ (n being the number of line wires).

5th. "An escapement for producing a step by step movement "of alternately unequal lengths." An axle, with two similarly-toothed wheels, one fixed and the other loose, has a tendency to revolve in one direction by means of any suitable motive power. A pallet with two catches, moving to and fro parallel to the wheel axis, stops alternately the teeth of the fixed and the loose wheel; the fixed wheel, having a pin which takes into a slot in the loose wheel, moves it; but when the loose wheel is permitted to move, it enables the fixed wheel to increase its motion by the length of the slot before being stopped by the pallet. A plan is shown by which a moveable stud may adjust the length of the slot. Another plan is shown by which the unequal motion is given by a "stud piece" on one side of the pallet, one wheel with pins on each side being used. In a fourth plan two similarly-toothed wheels are fixed on the axle, the teeth of one being a little in advance of those of the other, the pallet working in each wheel alternately.

6th. Enabling a pointer, &c., worked by a step-by-step action, "at once and by one bound to complete the remaining part of a "revolution." Referring to the 5th improvement (which need not, unless required, produce an unequal movement), the pallet is enabled to move to and fro in the direction of the plane of the pallet wheels as well as in the direction perpendicular thereto; thus, when required, the pallets can be drawn away so as to be out of gear with the step-by-step movement; the pallet has, however, a catch, which then comes in the way of a pin on the pallet wheel, and stops it at a determinate point. When the pallet returns to its original position the step-by-step motion is in gear again.

An arrangement suitable to revolve a type wheel, by which the type wheel, after having remained stationary for the purpose of having the type pressed or struck, itself returns to zero, is described and shown. The type wheel is attached to the axis of an arrangement, described above, by means of a spring and spring box; the type wheel is moved forward, as already described, to the desired position and the pallet drawn out of gear, thus bringing a portion of the pallet under a type stud so as to prevent the type wheel revolving; at the same time the spring is wound up, and, on the

engagement of the step-by-step action, the type wheel is set free and moved by the spring to zero.

7th. "Exhibiting to the eye symbols or letters by means of one "line wire and the combination of the perænode" with the 5th and 6th improvements. A perænode, connected with the line wire, works a secondary battery, which actuates one of two electro-magnets, according to the direction of the line-wire current. One electro-magnet actuates a dial by means of the 5th improvement; the other electro-magnet removes the pallet and permits the dial to come to zero.

8th. "The application of secondary batteries" to "printing, "stamping, or perforating" telegraph instruments.

Each of the instruments described under this head prints symbols or letters by the direct action of electro-magnets, which either cause the descent of types or of hammers to strike types; these electro-magnets are worked by secondary circuits, completed by perænodes, with or without the assistance of the apparatus described under the 6th head. Each type-lever electro-magnet is horseshoe-form, and its keeper moves on a joint; thus, by means of an arm or connecting rod jointed to the short arm of the type lever, bringing the type lever on to the paper whenever the circuit is completed through the coil of the electro-magnet; a helical spring, fixed to a standard, and at the other end to a projection from the type-lever axis, raises the type lever on breaking the circuit.

An instrument is first described, with three line wires and "primary" batteries, which prints symbols, each letter being made up of not more than three symbols; the combinations being also represented by $3^n - 1$ (n being the number of line wires), the arrangement of keys described under the 2nd head is used. In this apparatus there are three secondary batteries, three perænodes, six type-lever electro-magnets, and one paper-moving electro-magnet (round which the three insulated secondary circuits pass, in continuation of each type-lever magnet's circuit). The paper cylinder, on a screw axis, is moved by a step-by-step movement (See 5th head).

In a second instrument, any one of the 26 letters of the alphabet are printed instantly "by means of the combinations produced by "the action of three perænodes." In this case, the perænodes complete combinations of circuits when at rest, and break as well

as close circuits and combinations of circuits when actuated by the primary circuits. There are 26 type-lever electro-magnets; the other arrangements are similar to those of the first instrument.

In a third instrument, a perænode is combined with the escapement described under the 6th head, to print the letters of the alphabet. Four electro-magnets are used, two to the type-wheel escapement, one to work the paper cylinder, and one hammer-lever electro-magnet.

In a fourth instrument, a perænode is combined with the step-by-step movements described under the 6th head, but they are employed to rotate a barrel on which studs are helically disposed, so as to complete type-lever-magnet circuits by means of springs. The perænode works an electro-magnet in the step-by-step arrangement, which, by its springs and studs, puts into the circuit the right type-lever electro-magnet, and the reversal of the current through the perænode brings into action another electro-magnet that completes the secondary circuit round the type-lever magnet.

In a fifth instrument, with two line wires and capable of printing the letters of the alphabet, an arrangement very similar to that of the fourth instrument is adopted, but there are two perænodes breaking and closing circuits, and the stud barrels are five in number with five studs and letter springs each. There are 25 type-lever magnets. A screen, with concentric rings of letters and a moveable perforated disc, may be worked in connection with this instrument.

9th. The application of the perænode to "Morse's American "telegraph." An instrument, with two pens or markers, is worked by a secondary battery in connection with a perænode and one line wire, the perænode bringing one or other of the markers into the circuit of the secondary battery.

10th. Employing a chain, cord, or band in a telegraphic instrument. A cord, fixed at one end and preserved at a proper tension by a spring, carries a scale on which are the letters of the alphabet; bar electro-magnets, either in the primary or secondary circuit, act on levers so as to pull back the cord, thus enabling the required letter to be drawn opposite an arrow, or otherwise signalled. The law of combination respecting the line wires and signals is also expressed by 3^n-1 (n being the number of line wires).

A printing telegraph with three line wires, on this principle, is also described and shown. The keepers of the cord electro-magnets act directly on the cord, and the cord itself is wound round the axis of the type wheel, thus bringing any required letter under the type hammer. A separate electro-magnet, connected as in the other printing telegraphs, works the paper cylinder by an alternately unequal escapement, and the type hammer by a slot in the keeper arm; another slot in the keeper arm does not act to pull back a click from a click wheel on the type-wheel axis, until after the hammer has struck, thus, the loosening of the cord does not cause the return of the type wheel until after the type is printed.

11th. Using a pedal for placing a bell apparatus in the electric circuit, or removing it from the same; also for removing some or all of the battery metals from their liquids, or replacing the same.

12th. "The application to electric telegraphs of batteries" in which a solution of a salt of ammonia is used. The muriate or sulphate in connection with large plates of copper and zinc, separated by a porous material or cell, or placed far apart, is the arrangement preferred. These batteries act for a long period without attention.

13th. "Insulating suspended wires." Perforations are made through the suspending posts or their arms, through which the wires are passed; upon the wire is strung a non-conducting bead, having a transverse slit to slip it on the wire, which bead is fastened into the centre of the post by cement.

14th. Using enamelled or glazed metals, enamelled iron tubes or rods for instance, for insulating telegraphic wires.

15th. Insulating suspended wires with varnished cotton, protected at the point of suspension by a metal tag or covering, "placed in a manner resembling the tag of a boot-lace."

[Printed, 8s. 3d. See Repertory of Arts, vol. 13 (*enlarged series*), pp. 133 and 213; Artizan, vol. 6, pp. 201 and 250; and Patent Journal, vol. 5, p. 322.]

A.D. 1848, February 8.—N° 12,054.

BRETT, Jacob.—"Improvements in electric printing and other "telegraphs," consisting of:—

1st. Improvements on a printing telegraph described in N° 10,939.

Adapting type wheels to a hollow axis, by which the type is carried "forward or backwards." The type wheel is not fixed to the driving pinion, but has a certain motion communicated to it by an arrangement of ratchet wheels and clicks connected by a disc. Motion is given to the driving pinion when the escapement (hereinafter described) permits, by a weight or spring; the pinion is on an arbor passing through the type wheel's hollow axis, which arbor also carries a loose ratchet wheel and fixed disc; the type-wheel axis carries another ratchet wheel, worked by a click on the disc, whose tail passes through slots in the disc and loose ratchet wheel. On the movement of the driving pinion this arrangement also causes the movement of the type wheel; when the letter is printed, "a lever "with a moveable beak" moves the loose ratchet wheel, and (by its slot acting on the tail of the disc click) releases the type wheel, and sets it at liberty to be brought to its former position by a weight.

Motion is given to the escapement for releasing and checking the type wheels by a totally distinct train of wheels, which act "as a "subsidiary power." A "detent escapement lever" is acted upon alternately by a spring and electro-magnet, so as to release alternately the long and short arm of an escapement fixed on an axis rotated by the subsidiary power; this axis carries an excentric working in the tail of a suspended escapement-lever, the suspended escapement-lever being armed with pallets that regulate the motion of the type wheel.

Sounding the bell or bells of the printing machine. A toothed quadrant (actuated by a pinion on the type-wheel axis, and carrying a pointer which indicates the letter printed), has two pins, which act on levers with moveable ends, so as to draw hammers away from bells and afterwards release them when the quadrant is moved in one direction; but when moved in the other direction, the pins merely raise the moveable ends of the hammer levers. Two bells are thus struck at different times. In another arrangement, the hammer heads hang downwards and are acted upon by pins in a disc; the disc is connected with a toothed wheel on the same axis having a click which works in its periphery; the click is lifted by a "fork shaped lever" in connection with "an S shaped "lever;" a ratchet wheel is worked gradually forward by the fork-shaped lever, thus giving motion to the toothed wheel by means of a pinion; another pinion on the toothed-wheel axis works a quadrant, and brings its (the quadrant's) tail in gear with a large

pin wheel, at which time a cam wheel on the centre of the disc catches one of the forked levers, thereby releasing one of the hammers; the large pin wheel is used to wind up the disc, another to actuate the forked lever; the axis of the disc has "a weight " and cord or a spring adjusted to it, to keep the same ready to " work upon the hammer levers by means of the pins in the disc." In a third arrangement, a pin on the type wheel raises a crooked lever into such a position that a pin on the periphery of the printing excentric presses it downwards, thus acting on a bell hammer by a detent on the crooked lever axis. In a fourth arrangement, a pin on the type wheel strikes against a lever on the hammer axis, thus sounding the bell; the hammer returns to a banking pin after its recoil from the bell.

The Specification then describes a method of moving the "lever " with the moveable beak" (alluded to in the description of the motion of the type wheel), by means of two levers, in the tails of which excentrics work.

An escapement to act upon the type wheel consists of a "half- " moon piece" or pallet, which oscillates on its axis so as to lock alternately into the teeth of one of two wheels, thus carrying the type wheel forward a letter at a time.

A method of moving the type wheel through "one fourth or " one eighth" [of a revolution?] at a time is described and shown. The keeper of an electro-magnet presses a piston working in the hollow axis of the type wheel, which puts the pin wheel out of gear with its lever, and pushes forward a "locking racket," thus enabling the type wheel to revolve one division of the " locking racket;" when the pressure is removed from the piston, a spring puts the pin wheel again in gear. In this arrangement a hand, connected with the type-wheel axis by spur gear, indicates the letter being printed. The pressure of the inking roller is kept from the type by a weight hung from a cord passing over a pulley.

A pneumatic apparatus like "the bellows of an accordian," or a lever and adjustable weight, may be used to prevent too much pressure on the pins of the pin wheel, &c. (See N° 10,939).

A method of working a type wheel with four bevil wheels, two of which are [loose?] on the axis of the type wheel, and two carried by the type wheel itself perpendicular to its plane, is shown but not described; also a similar plan with three bevil wheels, only two of which appear to be in gear at one time.

Signal dials may have the letters arranged according to the order of their frequency.

2nd. A "'writing telegraph' in which by electro-magnetic "agency," certain marks are produced on paper "by means of a "pen or other marker," or "(in imitation of writing or otherwise) "by the passage of electricity through chemically prepared paper "or fabrics." In this last mode it is preferred to use paper prepared with plumbago, or otherwise made conducting, the communication or intelligence to be transmitted being written or marked with a non-conducting material. Metal plates or metallized surfaces may be used for the same purpose. A key-shaft for this telegraph is shown but not described.

3rd. The "'electric circuit regulator,'" for throwing one or more stations out of the circuit, when it is desired to communicate with certain stations only. A "pin escapement wheel," which is also a "star wheel," is made to rotate by the pallet end of an armature lever being made to act on the pins by an electro-magnet in the line-wire circuit; a roller at the same time being pressed into the teeth of the star wheel, assists the pallet and keeps the wheel in place during the action of the pallet. The telegraph circuit is completed or broken at any given station by "circuit "wheels" (or wheels having suitably placed conducting and non-conducting portions) on the escapement-wheel axis. A galvanic battery may be connected with this apparatus, so as to act on other similar apparatus in the circuit, by means of springs pressing on metallic bosses in connection with the circuit wheels.

A circuit regulator with a helically-toothed cylinder, instead of a circuit wheel, for working a series of magnets, is shown but not described; or a spirally-toothed face-wheel may be used.

The line wires are proposed to be strained between the posts by means of "forks" (of metal or wood) fastened to the posts by means of a bolt which carries a click wheel.

4th. "A mode of indicating the position of a locomotive engine "or railway train upon a line of railway at any part of its journey "by means of levers at fixed distances, which are acted on by the "engine in its passage, and communicated by electric agency with "the next station."

5th. "Combining permanent magnets with electro-magnets for "the purpose of increasing the action of the former."

6th. Arrangements for making and breaking the connection between a principal and a secondary voltaic battery.

7th. The use of metal types for composing telegraphic communications.

8th. "Combining and applying permanent magnets within "hollow coils" (in connection or not with electro-magnets), to obtain an increase of power at a distance from the main battery.

9th. Increasing the action upon a permanent magnet of the electricity transmitted through coils of wire surrounding the same.

10th. Suspending bar permanent magnets, to facilitate the action of electricity on the same, so that audible or other signals may be given by their deflection.

11th. The use of magnets with two similar poles for telegraphic purposes.

The particulars of the 5th, 6th, 7th, 8th, 9th, 10th, and 11th heads, and of other matters, are described in the Specification in nearly the following order.

Various arrangements of permanent horseshoe magnets, mounted at opposite sides of a beam, or counterbalanced, and entering coils of wire (with or without soft iron cores) that may complete a local circuit, are described and shown. A local circuit may also be completed at intervals by a spindle with a cam, worked by an escapement in connection with the line-wire circuit.

To strike a bell. A permanent bar magnet is poised from the pole of another permanent magnet (or between the poles of two permanent magnets), so as to point North and South; a bell is so placed that it may be sounded "when a current of electricity is "projected towards either of the poles."

Two bar magnets with similar poles are shown.

An improved keyboard (See N° 10,939). The keys are placed in alphabetical order, but act on the barrel in the order of the frequency of use of each letter, for this reason the pins are not disposed helically on the barrel. In this arrangement a moveable friction wheel, poised upon a lever, is adopted to convey the motion of the wheel train to the barrel. On the depression of a key, a lever proceeding under all the keys is depressed and puts the friction wheels in gear, thus bringing the desired pin under the key; a pulley with a cord of a proper length and a weight is fixed to the barrel axis, and this, in conjunction with a pair of

ratchet wheels (one fixed to the barrel, the other not) the clicks of which can be released alternately, enables the barrel to revolve back to the starting point.

"Communicators" are described and shown (one with a circular dial, the other a quadrant with four rows of signals), in which a series of shocks is sent by means of springs in connection with a circuit wheel. Ratchet wheels and clicks are used to convey suitable motion to the circuit wheel from the handle.

Caoutchouc, or caoutchouc and gutta percha, are used to cover telegraph wire by dissolving them in benzole, "alliole" [allyle ?], or "tolnole" [toluole ?]; also the gums, and list saturated with boiled oil, &c., may be used.

[Printed, 2s. 5½d. See Artizan, vol. 7, p. 14; and Patent Journal, vol. 5. p. 427.]

A.D. 1848, February 28.—N° 12,076.

ROBERTS, JOHN CRAFT.—Communicating between the carriages, or guard and engine-driver, in a railway train, and "between distant "places on the line."

The Specification and Drawings describe and show :—

An alarm steam-whistle, put into action by an electro-magnet acting through a series of levers, on a slide-valve which admits steam to raise a piston in a cylinder; to the piston is attached the cock, handle, or lever, by means of links. The whistle is thus sounded when the electro-magnet is active. Springs bring back the piston and armature to their original places when the magnetism ceases.

An alarm steam-whistle, put into action by a valve raised when the electro-magnet is active, (by means of a lever attached to the armature and valve,) and replaced by a spring when the magnetism ceases.

The arrangement of conducting wires, galvanic battery, and signal apparatus. Two conducting wires are fastened beneath each carriage, and "secured to isolated" [insulated ?] "metal staples" "in the end framing." The wires belonging to each carriage are connected by a "pendant" "spring clip and jointed staple." The battery, which is beneath one of the carriages or the engine or tender, is included in the electric circuit in the usual manner. Each carriage has two wires proceeding to the communicating instrument, one from each conducting wire. When the communicating

instrument of any carriage is put into action the circuit is completed, and the alarm whistle on the engine sounded.

"The detective communicator," consisting of a metal pin in contact with one battery pole, and a bolt and spring in connection with the other; these, under ordinary circumstances, are kept apart by an ivory ring on the pin, but when a knob attached to the pin is pressed, the ivory ring slides out of the way of the bolt, and enables the circuit to be completed. This instrument shows which carriage the signal was made from by the metal pin being continued outside the carriage frame and projecting therefrom. The guard releases this pin by a key. The guard's "communi-" "cator" is made so that the ivory ring is flush with the pin in connection with the battery, to facilitate signalling by repeated sounds.

Communicating between distant places, which is accomplished by employing the "improved arrangements" in connection with "the stationary telegraph wires;" this plan can only be used "where stationary engines are employed," as steam is required.

[Printed, 1s. 3d. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 157; Practical Mechanics' Journal, vol. 2, pp. 215 and 233; Artizan vol. 6, p. 251; and Patent Journal, vol. 5, p. 367.]

A.D. 1848, March 8.—N° 12,079.

WHISHAW, FRANCIS.—"Manufacture of pipes," &c., "suitable "for the passage of *the wires of electric telegraphs* in a state of "insulation, and other purposes." The invention consists:—

1st. "In the formation of any required number of pipes,' &c., within "the same mass" of earthenware or pottery. The clay is pressed through a suitable "die or 'dod'" at the end of a cylinder by a piston, cut off into certain lengths, and then allowed to dry, &c., as at present. The lengths of pipe are united by socket joints, into which cement is run, a "register mark" enables the lengths to be fitted properly. Curved pipes are made by means of plaster moulds with "guage plates" at each end of the mould to receive the curved rods that form the cavities in the clay pipe.

2nd. In the manufacture of earthenware pipes "by means of a "conical die or 'dod.'" This die has a conical elongated core, thus causing the clay to be pressed more firmly together before it leaves the die, than it could otherwise be.

3rd. In the employment of collars and plugs to combine separate pipes, or to insert into ordinary pipes to combine other pipes or telegraph wires in them. The plugs may either consist of short lengths of clusters of earthenware pipes, or of gutta percha in the case in which glass pipes are laid in an earthenware one.

4th. In a method of combining pipes by means of air-tight joints. A cavity, or internal grooved ring, is made in a thickened end of the pipe which admits the end of the next pipe; this has an external grooved ring forming part of the cavity when the pipes are laid. Into this cavity cement is poured by means of an external aperture.

[Printed, 10*d*. See Repertory of Arts, vol. 12 (*enlarged series*), p. 312; London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 181; Artizan, vol. 7, p. 15; and Patent Journal, vol. 6, p. 15.]

A.D. 1848, April 27.—N° 12,136.

BARLOW, WILLIAM HENRY, and FOSTER, THOMAS.—"Im- "provements in electric telegraphs, and in apparatus connected "therewith," consisting of:—

1st. "A machine for covering" telegraph wire with a compound of gutta percha, "cowrie or New Zealand gum, and flowers or milk "of sulphur;" in which an upper and an under "sheet or fillet" of the above compound are passed between steam-heated rollers, and brought together at heated grooved rollers, which the wires to be coated pass through, between the sheets or fillets, and are thus coated with the material.

2nd. A "step-by-step" printing telegraph, in which the symbols are indicated by means of two electric currents, producing a different signal when acting separately, and also when acting conjointly. A bevil gear differential escapement is made to act by clockwork, when released by catches from one or both keepers of two electro-magnets, magnetised respectively by the electric currents. The motion permitted by the escapement carries round a type wheel, by a prolongation of the shaft; the paper is moved forward and printed, and the type wheel disengaged and restored to its place, by suitably placed pullies, a spring hammer, wheel, catch, cams, and rods, worked by means of another train of wheelwork, released whenever either or both the electro-magnets act. To prevent the stopping of the printing machinery until the symbol has been completed, the stop lever has to raise the tail piece of a "governor" before it stops the motion.

3rd. A "train indicator," showing that a train has passed a certain station, and when it passed. A lever, connected with the keeper of an electro-magnet, worked by a wire from the station required, presses a stud forward from a "dial" which revolves by clockwork. The lever may also strike a bell when the signal is given.

[Printed, 2s. 2d. See Repertory of Arts, vol. 13 (*enlarged series*), p. 341; Mechanics' Magazine, vol. 49, p. 497; and Artizan, vol. 7, p. 82.]

A.D. 1848, July 12.—N° 12,212.

STAITE, William Edwards (*partly a communication*).—"Improvements in the construction of galvanic batteries, in the "formation of magnets, and in the application of electricity and "magnetism for the purpose of lighting and signalizing, as also a "mode or modes of employing the said galvanic batteries, or some "of them, for the purposes of obtaining chemical products."

1st. "'Perfluent'" galvanic batteries. A single-fluid perfluent battery has the fluid supplied at the first cell in series, and discharged at the last, it having proceeded through all the cells in order by a circuitous course, viz., alternately to the right and left; for this purpose two holes in the bottom of each cell lead to two channels underneath the cells. A double-fluid battery has two channels underneath it, one for the negative-metal solution and the other for the zinc solution; communication is made between the porous cell containing the zinc solution and its channel by means of a varnished copper tube with a transverse slot forming a part of the channel, the whole being secured by vulcanized caoutchouc washers, and a nut working on a solid screw terminating the copper tube. Examples are shown also of the use of syphons in the perfluent system; the syphons being so arranged in respect to depth in the fluid that the most exhausted portion of the liquid is conveyed from cell to cell.

2nd. "Regulating the supply and discharge" of battery liquids. In the first arrangement, all the cells communicate with one common discharge channel; and, instead of using a syphon with a plug at the top (one leg of which communicates with the discharge channel, and the other passes through the bottom of the trough), as heretofore used, a flexible funnelled hose, attached to the discharge channel, is raised and lowered periodically, so as by that means

alternately to partially supply and discharge the cells. In a second arrangement, for liquids that become heavier by working the battery, a common under and discharge channel is used, in connection with a supply pipe extending along the top of the battery, having a small orifice over each cell, through which the liquid drops. In a third arrangement, for liquids that become lighter by working the battery, the cells are replenished from a supply vessel at a higher level than the liquid in the cells, "through holes or "spouts placed at the required level in the side of each cell." In a fourth mode, sulphate of copper solution (for instance) is regularly supplied to the negative plate compartments, at such a rate in proportion to the amount of electric current produced that the liquid is exhausted by the time it has arrived at the surface, it then (having become dilute sulphuric acid) overflows into the zinc compartment, and, when it is sufficiently charged with zinc, is finally drawn off.

3rd. Supplying galvanic batteries with liquid by means of an "equilibrited" [equilibrated ?] "hydraulic cistern and graduated "meter." A cask has but one orifice near the bottom, opening into a small cistern, into which is immersed a syphon, the position of which can be regulated so as to drop any determinate quantity of fluid into a tube having an aperture at the bottom, and graduated with units corresponding to those on the galvanometer described under the 7th head.

4th. "Enclosing a liquid mercurial amalgam of zinc" in a bag of lawn, horsehair cloth, &c., to be used "in lieu of the amalga-"mated zinc plates or rods of galvanic batteries."

5th. The substitution, for the zinc plates ordinarily employed in galvanic batteries, of solid plates of an amalgam of 5 parts of zinc to one part of mercury.

6th. "The employment of lead as the positive element in gal-"vanic batteries," (instead of zinc,) combined with a solution of nitric or acetic acid.

7th. A galvanometer. A coil of thick wire encloses in its hollow cylindrical centre a rod of soft iron free to move loosely up and down in it; this rod carries an index, whose position is ascertainable from a glass tube fixed to the coil, and graduated so "as to indi-"cate the number of grains of pure zinc consumed per minute in "each cell of the galvanic series."

8th. "The formation of magnets." "The best Swedish char-"coal iron" is "'converted'" by only carbonizing it "'just "'steel through.' The blistered product is then melted and cast," and the resulting ingot "rolled out into thick sheet metal."

9th. A "mode of hardening magnets previous to magnetising "them." They are polished, "heated in a bath of melted metal "raised to a red heat (using, by preference, lead)," and plunged into water.

10th. Electric lamps. The general arrangement of the first apparatus is similar to that described in N° 11,783. In the present improvement the connection between the regulator coil and the lower electrode is by means of a counterbalanced lever, attached at one extremity to the iron core of the coil, and having a spring that engages a weighted pallet (constantly worked to and fro by clockwork) in the square teeth of a wheel when the core descends; but when the core ascends, by the greater power of the electric current, the pallet takes into the square-toothed wheel in the opposite direction and drives it the opposite way. The square-toothed wheel is on the axis of a pinion that works in a rack on the electrode shaft; therefore, according as the regulator core moves down or up, the electrode is propelled up or down. A catch, on the counterbalanced lever, meets bent arms on the crank axle driving the pallet when the electrodes are at the proper distance apart, thus stopping the clockwork.

In another improvement, the upper electrode consists of a disc or circular electrode with conical edges fixed on an axis to which slow rotary motion is given by clockwork. A metal scraper keeps the edge of the disc clean.

In a third improvement, iridium or its alloys are used for the electrodes; the electric current is made to pass through a continuous piece of iridium soldered to platinum and fixed to suitable holders connected to the battery poles. The metallic electrode holder may be enveloped in glass or other non-conductor of heat and electricity. Several electrodes, connected to separate batteries, and mounted in insulated holders of copper tube, may also be used.

11th. Regularly intermittent and permanent electric light apparatus. In the chief intermittent apparatus the moving power is a coil (included in the electric circuit) whose dimensions vary at different parts of its length; the lower electrode shaft is attached

to the core of the coil and carries a rack; the whole is rather more than counterbalanced. When the circuit is complete, the coil draws the core into it and separates the electrodes until they are so far apart that the light goes out, the counterbalance weight then brings the electrodes together and re-establishes the light, and the action is repeated. To regulate the separation of the electrodes a pinion, having "'backlash,'" connected with multiplying wheelwork and a fly, is used; instead of the pinion with backlash, a circular rack (on the side of the pinion) and spring ratchet may be used; or two pinions, each able to revolve free of its spindle in one direction only. A compensation chain hanging to the counterbalance weight is deposited on the framework as the electrode wears away.

A permanent light is produced by a similar apparatus, in which the coil is more powerful, and the counterbalance weight is balanced by the force of the helix before the electrodes are too far apart; the compensation chain and slow-motion pinion (without backlash) are also used in this modification. In a second apparatus, a permanent light is produced by somewhat similar apparatus to that described under the 10th head, but the depression of the counterbalanced lever (rather more than counterbalanced in this case) brings the battery poles together, thus partially diverting the current from the electrodes, and enabling the lower electrode to rise nearer to the upper electrode. In a third arrangement (in which great moving power and length of motion of the electrode is given), the electrode shaft passes through the hollow core and has ratchet teeth cut on its side; the core has a click working into them, which supports it; and it (the core) is prevented from going out of the range of the coil, when the electrode is burnt, by an end screwed on the coil top, which forces the click from the teeth, keeps the core in its place, and enables the electrode to ascend as required; the coil's magnetic power is strengthened by surrounding it with iron. Hyperboloidal reflectors for lighthouses are adjusted without removing the glass shade.

12th. Improving the intensity of the electric current. A long coil of insulated copper ribbon, wound in an iron case, is included in the circuit.

13th. Enclosing the electrodes in supporting tubes when they are long. Spring conductors fixed on the tube embrace the electrode near its end. The electrode may be composed of many

pieces slightly joined together, and the tube have a limited free sliding motion to prevent the electrode being drawn backwards in it.

14th. Preparing the materials for the electrodes. Carbonaceous powder is mixed with brown sugar; the mixture is melted, boiled, pressed while hot into iron moulds having crevices to permit the escape of the gases, and the whole is heated gradually to a red heat and gradually cooled; then heated to a white heat in a sand luted crucible.

15th. The employment of galvanic batteries (preferably perfluent), for obtaining chemical products, in conjunction or not with their use for other purposes. To utilize the sulphate of zinc from sulphuric acid and zinc batteries the oxide is precipitated by the sesquicarbonate of ammonium, and the resulting solution is used again in the battery. Nitrate of lead is produced from a battery in which dilute nitric acid acts on platinized lead plates; the solution is afterwards treated with a carbonate of potash; white lead of commerce is in solution, and may be obtained by evaporation. "Muritatic" [muriatic?] acid, by a similar process, yields chloride of lead; chlorides of iron and zinc may be also obtained by battery action. In a battery of copper, iron, and sulphate of copper, sulphate of iron is produced and copper deposited on the copper plate; thus the ores of the sulphuret, or cupreous mineral waters, may be made to yield metallic copper and sulphate of iron.

[Printed, 4s. 4d. See Mechanics' Magazine, vol. 50, pp. 49 and 73; Artizan, vol. 7, p. 26; Patent Journal, vol. 6, p. 146; and Engineers' and Architects' Journal, vol. 12, p. 53.]

A.D. 1848, July 20.—N° 12,219.

LE MOLT, Alexandre Edouard.—1st. "Constructing galvanic or electric piles." Carbon is used as a negative plate; "the hard deposit of carbon" found in gas retorts, cut into the required shape, is preferred. Carbon plates may also be made by using pulverized coal, coke, or charcoal, mixed in certain proportions with "the carbon obtained from gas retorts ground fine," and tar; these are mixed, moulded in a metal mould, subjected to pressure, and dried by standing "in the atmosphere," when the mass is heated in a nearly closed retort gradually to a bright red heat, and gradually cooled. "The end" of the "carbon element" is "electrotyped with copper or other metal," to enable it to be

soldered to the strip of metal fastened to the amalgamated zinc of the next cell. The zinc plate is coated with varnish on the inactive portions (copal varnish thickened with powder of retort carbon preferred); the "connecting metal" and "electrotyped" end of the carbon are also coated.

2nd. Using carbon disc electrodes for the electric light, that revolve near each other, so as to constantly present "fresh sur-" faces." Suitable clockwork rotates the electrodes, with "a slow " uniform motion," by means of chains and chain wheels in connection with the driving wheel, round whose centre the bearings of the discs have free motion, but are kept as near together as possible by a helical spring connecting the "arms" in which the bearings are mounted. The discs are kept at a proper distance by a cam wheel (receiving motion through a train from the driving wheel), against which a screw pin on each "arm" bears, so as to regulate properly, by the steps cut on the wheel, the distance between the electrodes. The kind of carbon preferred for electrodes is that from gas retorts purified by immersion in nitric, muriatic, and fluoric acids.

[Printed, 6*d*. See Repertory of Arts, vol. 13 (*enlarged series*), p. 166; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 31; Mechanics' Magazine, vol. 50, p. 91; Artizan, vol. 7, p. 132; Patent Journal, vol. 6, p. 153; and Engineers' and Architects' Journal, vol. 12, p. 80.]

A.D. 1848, July 20.—N° 12,220.

NAPIER, DAVID, and NAPIER, JAMES MURDOCH.—1st. "Im-" provements in mariners' compasses." "The direction of a ship's " head" is registered on "a circular disc of thin paper," placed over the compass card, with the points of the compass and concentric circles denoting equal spaces of time, marked on it. Clockwork, in the bottom part of the compass box, gives uniform motion to a cranked spindle and connecting rod, which communicates through levers with a rocking shaft loose on a screw axis; which screw axis gives motion to the marking point. During the upward motion of the connecting rod, the rocking shaft lifts the point from the paper disc, and moves the screw a portion of a turn by means of a ratchet and clicks; when the connecting rod descends, the point receives a forward motion from the screw, and comes down on to the paper. The other end of the connecting-rod lever moves a " three-branch piece," working on a tube on the compass pivot, up to the under surface of the card at the same time that the point

descends. The cranked shaft revolves once in three minutes, consequently the point pricks the circular disc as often. Thus the path of the point being placed in the line of the vessel's keel, the direction of the ship's head is registered on the paper disc, and the time it was in any particular direction noted. Another set of levers, connected with the steel point supporting the card, lower the point when the box is opened, by the force of a spring, thus preserving the point.

2nd. "Improvements applicable to barometers."

3rd. "Improvements to apparatus for measuring the speed of "vessels passing through water, which improvements are also ap-"plicable to ascertain the speed or velocity of currents."

4th. "Improvements to apparatus for measuring the weight of "bodies or substances, such apparatus being commonly known "by the designation of weigh bridges or platform balances."

[Printed, 3s. 5d. See Mechanics' Magazine, vol. 50, p. 92; and Engineers' and Architects' Journal, vol. 12, p. 79.]

A.D. 1848, August 10.—N° 12,236.

HENLEY, William Thomas, and FORSTER, David George.—Improvements in electric telegraphs, "and in apparatus connected "therewith, parts of which improvements may be also applied to "the moving of other machines and machinery," consisting:—

1st. In acting on a magnet, on the axis of a visible index or pointer, "by a single electro or other magnet, having each of its "extremities converted or resolved into two or more poles." Several arrangements are described and shown in which the magnetic needle is suspended between the poles of a horseshoe electro-magnet, each pole being mounted with a piece of iron of a segmental form, or of such a shape as to develope two similar poles.

2nd. In causing the magnetic needle to be deflected in one direction for any length of time required, by an induced magneto-electric current, and bringing it back to its stationary position by the reversed inductive current.

3rd. In obtaining two equal and opposite electric currents by means of magneto-electric arrangements. In one arrangement, two coils (with cores) vibrate on separate exterior centres, between the permanent horseshoe magnet and its keeper, by the depression of springs. In a second arrangement, a single coil (with core)

is suspended from a centre between the poles of a horseshoe magnet, and moveable to one side or the other, according to the direction in which the current is required to flow. In a third arrangement, two coils (on an armature) are mounted on an axis between the poles of the permanent magnet, and are free to move in front of those poles; each pole has two branches and the motion of the coils is only in a sufficient arc to bring them opposite to the magnet's poles; "one pole of the magnet is not released from "its opposition to the armature until the other just touches it;" thus opposite currents of equal power are produced. By either of these arrangements, "single or double currents may be sent, as "required, through any required number of instruments at "different stations."

4th. In an "improved apportionment of the signs or symbols "used in electric telegraphs." These are made with two needles, each of which move only in one direction; the signs are signified by their single or combined motion; to form a complete signal they may either move one after the other or simultaneously.

5th. In an improved compound of gutta percha, suitable for insulated wire, &c. transmitting electric currents. Very highly pulverized sand or glass is mixed with gutta percha, either in solution or in a plastic state.

6th. In the use of a "current reverser" that, by one depression of the key, completes, reverses, and breaks the circuit "in the "manner of the magneto machines." The key, by means of pins in connection respectively with a battery pole, makes connection with an upper and then with a lower pair of springs, the latter being connected crosswise; the upper pair only complete the circuit on the depression of the key.

7th. In the application of magneto-electricity (excited in hollow coils affixed to the extremity of a pendulum, and vibrating over the poles of fixed permanent magnets) to regulate the motion of timekeepers. No soft iron is used in this arrangement, and the current is reversed at each vibration.

8th. In applying "to the regulating of timekeepers of currents "of electricity transmitted from a primary or standard clock." The needle and double-poled magnet, described in the 1st improvement, is applied to move the escapement of a clock, by a fork on the magnet's axis vibrating an arm on the escape wheel;

or it may move the clockwork itself. An electric timekeeper is described and shown, having a dial divided so as to point out the time by the hour hand only, the space between the hours being divided into 60 equal parts. A reverser to be placed on the escape-wheel arbor, with four points placed crosswise dipping into two mercury cups, is described and shown; also another reverser, with two insulated levers dipping into right and left-hand pairs of mercury cups alternately, to be placed on the pallet arbor; the wires are connected crosswise to the mercury cups. This last arrangement may be employed in conjunction with the double-poled magnet and needle to work turret clocks by a "secondary "battery."

[Printed, 1*s*. 3*d*. See Mechanics' Magazine, vol. 50, p. 145; Artizan, vol. 7, p. 207; and Patent Journal, vol. 6, p. 236.]

A.D. 1848, August 15.—N° 12,241.

TRUMAN, EDWIN THOMAS.—1st. Manufacturing "artificial "teeth and gums, and making good other deficiencies of the "mouth in connection therewith by employing gutter percha," and "coating the surfaces thereof with metal." "A model of the "mouth in plaster" is obtained, and artificial teeth and gums made from it and moulded upon it in gutta percha, completely covering a gold "plate or bar," placed to strengthen the gutta percha, and having pins (not covered by the gutta percha) soldered to it, on which the artificial teeth are to be fixed. The gutta percha is then warmed, placed in the mouth with the new teeth, and pressed "into position, by which it will become perfectly "adapted to the mouth." It may be electro-gilt, or not, as desired (except the pins and the surface next the gums), and the artificial teeth fixed on to the pins "by cement" in the usual manner.

2nd. Applying "electro-gilding in the manufacture of artificial "teeth and gums as a coating to soft materials." Instead of using gutta percha and electro-gilding as above explained, wax or other suitable matter may be employed, electro-gilt all over, thus completely enclosing the material which might otherwise "be "unsuited to be worn in the mouth."

[Printed, 3½*d*. See Repertory of Arts, vol. 13 (*enlarged series*), p. 188; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 117; Mechanics' Magazine, vol. 50, p. 187; Artizan, vol. 7, p. 184; and Patent Journal, vol. 6, p. 215.]

A.D. 1848, September 4.—N° 12,262.

RICARDO, John Lewis.—"Improvements in electrical tele-"graphs, and in apparatus connected therewith," consisting of:—

1st. Improvements in "combining two or more wires for elec-"tric telegraph purposes, by enclosing them between two fillets "of gutta percha, or compounds containing that material, in such "manner as to insulate one wire from the other or others, and "from external matters." The wires are conducted from their respective reels "through suitable guides to and between "grooved rollers heated by steam," which roll the fillets over the wires so as to perfectly insulate them from each other and from external matters; the indentations caused by the rollers being between two consecutive wires, and the end "beads," produced by the roller grooves, being without wires. The telegraph wire, when made, is received upon "a roller acted on by a weighted cord or "otherwise." The surfaces of the fillets that are to adhere are passed over hot surfaces, and, when necessary, the under fillet is supported. It is preferred to use a combination (in certain stated proportions) of gutta percha, "gum cowrie or New Zealand gum, "and flower ors" [flowers or?] "milk of sulphur."

2nd. "An improvement in apparatus for suspending wires for "electric telegraphic purposes." The Specification and Drawings describe and shown an insulator, through the centre of which is fixed (by cement) a hook for suspending the wires. An annular space or "throat"—to prevent water "passing up the interior" so as to destroy the insulation of the wire—is left. This annular space is shaped like an inverted conical cup, having the tube with the hook in its centre. The insulator is also provided with a groove and flat side for fixing it properly to the telegraph post.

[Printed, 5d. See Repertory of Arts, vol. 14 (*enlarged series*), p. 1; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 159; Mechanics' Magazine, vol. 50, p. 232; Artizan, vol. 7, p. 183; Patent Journal, vol. 6, p. 216; and Engineers' and Architects' Journal, vol. 12, p. 118.]

A.D. 1848, September 28.—N° 12,276.

ALLMAN, Fennel.—"Certain improvements in apparatus for "the production of light from electricity," consisting of various apparatus for regulating the distance between the carbon or other electrodes used to produce the electric light, by means of the electric current which causes the light, these apparatus forming a

part of the same circuit, and one of the electrodes being moveable by means of one of the effects of the electric current; also apparatus for regulating the "emission" and "ingress" of the battery fluids.

In the first arrangement, one of the electrodes is attached to, and moves with, the extremity of the needle or "permanent magnet" of a galvanometer.

In the second apparatus, "induced magnets" are made to act on the needle or "permanent magnet."

A third arrangement consists of fixed "induced magnets" acting on others mounted on the extremity of a poised lever. In these three arrangements either the attractive or repulsive magnetic force may be used, and an adjustable weight opposes the deflection of the needle or lever.

In a fourth apparatus, the expansion of a heated metallic conductor, or the curvature of a heated compound metallic bar, is made to act on one of the electrodes.

A fifth apparatus consists of a voltameter, which raises a gasholder against the detaining force of springs, by the exit provided for the gas being proportioned to the current used.

The "emission" and "ingress" of battery fluids is regulated by their specific gravity. The heavy and spent fluid sinks a counterpoised vessel, thus lengthening the leg of a discharging syphon, or a ball cock opens when the liquid becomes too heavy.

Pumps, &c., may be used to supply or exhaust the battery.

[Printed, 2s. 1d. See Mechanics' Magazine, vol. 50, p. 306; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 305; Artizan, vol. 7, p. 207; and Patent Journal, vol. 6, p. 255.]

A.D. 1848, October 12.—N° 12,287.

DUNN, Arthur.—" Improvements in ascertaining and indicat-" ing the temperature and pressure of fluids."

The mercury, either of a thermometer or of a pressure gauge, completes an electric circuit (by means of an iron float tipped with " platina"), and rings a bell whenever the temperature or pressure arrives at a determined point.

This apparatus is applied to a steam boiler in the following manner:—A metal thermometer tube in the boiler is connected with two glass tubes, into which electrodes project; one tube (to give notice when the steam rises to the working pressure) completes the circuit through a lever, which breaks the circuit as the

temperature rises above that point; the other tube gives notice when the steam rises to too high a pressure. Each of these circuits has a separate bell apparatus, and several bell apparatus in several places may be employed.

When this invention is applied to a pressure gauge, a "platina" wire is introduced into the ordinary glass gauge at the required height; or several platinum wires at various heights may be included, as required, in the circuit.

[Printed, 10*d*. See Repertory of Arts, vol. 13 (*enlarged series*), p. 352; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 335; Mechanics' Magazine, vol. 50, p. 379; Artizan, vol. 7, p. 230; and Patent Journal, vol. 7, p. 20.]

A.D. 1848, October 26.—N° 12,295.

HJORTH, Soren.—"Certain improvements in the use of electro-"magnetism, and its application as a motive power, and also "other improvements in its application generally to engines, "ships, and railways."

The Specification and Drawings describe and show various electro-magnetic engines, which have for their principle of action the motion of a magnet or electro-magnet, so that points or parts of its surface or poles come successively under the influence of the points or parts of the surface or poles of a fixed electro-magnet or magnet, thus enabling a rotary or reciprocal motion to be had and sustained over a great length of stroke.

An "oscillating engine" is described and shown, constructed upon the above principles, in which the electric current is admitted alternately to one of two double-horseshoe magnets (the fixed magnet forming one horseshoe, and the moveable magnet the other); one acting during one half revolution of the fly-wheel shaft, the other during the second half revolution. "Suitable adaptions of "beams, rods, cranks, &c." will enable any required form of engine to be constructed. The fixed magnets are made hollow, "conical "on the inside," and with surfaces of various suitable shapes inside them; the moving magnets are made "conical on the outside," and with corresponding apertures. Other forms of horse-shoe magnets are described and shown, made to act on the above principles when combined in an engine.

A rotary engine is described and shown, in which fixed horseshoe magnets are arranged on the surface of a cylinder, with the line joining their opposite poles parallel to the axis on which they cause the

moveable magnets to rotate; the electric current being supplied to the fixed magnets in advance of the moveable magnets in succession, and cut off as the moveable magnets pass them. The fixed magnets form cases for the moveable magnets to pass through.

A method of obtaining "a reciprocal rotary motion" (which may be converted into a rotary motion "by cranks," or applied directly to the work) is described and shown; an S-shaped solid magnet works into a similarly shaped stationary magnet, the poles of which form cases for the reception of the poles of the moveable magnet. "Two sets of magnets will be ordinarily re-" quired, working in opposite directions."

The "commutator" used for rectilinear reciprocating engines may either be arranged as a slide-valve is in the steam engine (a metallic slide and insulated metallic surfaces, in connection with the battery and the coils of the electro-magnets, taking the place of the valve and steam ports in the steam engine), or an oscillating or rocking shaft may alternately bring the conductors of opposite magnets into contact with adjustable metallic springs connected to the battery. The "commutator" for rotary engines is the common arrangement of conducting pieces inlaid in a non-conducting portion of the rotating shaft.

A "governor," analogous to the steam-engine governor, regulates the supply of electricity to the engine by acting upon a slide, included in the electric circuit, so that a wider or narrower portion of a conducting wedge is brought into contact with a parallel conductor. Either the attraction or repulsive magnetic influence, or both, may be used as a motive power, and the power may be applied to all purposes for which power may be required.

This invention also relates to the production of magneto-electricity in a locomotive. "Soft iron or electro-magnets" are fixed between the spokes of the wheels, so that during their motion the electro-magnets may pass between the poles of fixed horseshoe permanent magnets. The coil of the electro-magnets is continued round the axle of the wheel, magnetising it when in motion in proportion to the speed, thus giving it "an increased adhesion" to the rails; or the electricity generated may be used as an auxiliary motive-power. Revolving fly-wheels, paddle-wheels, or drums may thus be made available for generating auxiliary electric power.

[Printed, 1*s*. 2*d*. See Mechanics' Magazine, vol. 50, pp. 409 and 433; Practical Mechanics' Journal, vol. 2, pp. 59 and 88; Artizan, vol. 7, pp. 121 and 146; and Patent Journal, vol. 7, p. 118.]

A.D. 1848, November 4.—N° 12,317.

BACHHOFFNER, GEORGE HENRY.—"Improvements in means "of transmitting, communicating or conveying intelligence" by the agency of electricity, consisting of: —

1st. "A mode of actuating the pointers or indicators by means "of permanent and temporary or electro-magnets."

2nd. "An arrangement for obtaining the step-by-step move-"ment of the hand pointer or indicator."

Referring to these two heads, "an electro-telegraph" is described and shown, having the above improvements adapted to deflect a pointer in the upper part of the instrument, to rotate a hand over a dial, and to strike an alarum. The pointer is deflected by means of a bar electro-magnet free to vibrate on a horizontal axis at right angles to the line joining its poles; at the lower end a permanent horseshoe magnet attracts the pole of the electro-magnet to one side or the other, according to the direction of the current; when deflected, the upper end of the electro-magnet presses against cords to which weights are hung, which break contact with the permanent magnet on the cessation of the current. The hand or indicator is rotated over the face of a dial by another vibrating electro-magnet having pallets on its axis of motion working into a pallet wheel on the indicator axis, and, by the shape of the pallets, causing it to rotate. The bell apparatus also has another vibrating electro-magnet, to which the hammer is attached by a slight spring; on the deflection of the electro-magnet the bell is struck. The current actuates either the bell, the pointer, or the dial hand, according to the position of the metal bars of "current changers" attached to the instrument; the wires of the various "apparata" are, for that purpose, connected in pairs with insulated pieces of metal disposed in a circle, over which the metal bars move. The keys for completing the circuit are connected to the "current changers" by their hinges, and make connection with the battery by studs and mercury cups. The electro-magnets may be mounted so that both their poles are acted on by the same permanent magnet.

3rd. "A method of straining or tightening the telegraph wires "when suspended on posts." At suitable intervals a post is erected, having the upper portion moveable either up or down by rack and pinion work; thus deflecting the wires from "their natural curva-"ture" between the fixed posts, and straining them accordingly.

The tops of the posts are completely covered with caps of insulating material.

4th. "Certain arrangements of the letters and figures *on dials* "in combination with pointers or indicators actuated by electricity." The deflecting pointer or pointers indicate the letters or numerals by the direction and number of the deflections; and the revolving hands have three branches pointing respectively to three different circles, the first containing the letters, which may be arranged either alphabetically or as a "printer's or compositor's "fount," the second containing numerals, and the third the number of the stations on the line. A dial is also described and shown, having eight indicators, pointing respectively to alphabets, numerals, and written messages; also a dial with two deflecting pointers, showing (with not more than two deflections to each) twenty letters and four numerals, and their combinations.

[Printed, 2*s.* 1*d.* See Mechanics' Magazine, vol. 50, p. 451; and Patent Journal, vol. 7, pp. 33 and 40.]

A.D. 1848, November 21.—N° 12,335.

CLEMENT, William Hood (*partly a communication*).—"Certain improvements in the manufacture of sugar, part of which "improvements is applicable to evaporation generally, also improved apparatus for preparing the cane-trash to be used as "fuel," consisting of:—

1st. "Mechanical arrangements for the better manufacture of "the sugar from the cane," being partly improvements on the invention described in Letters Patent, N° 11,312. Portions of the present invention are "applicable to evaporation generally."

2nd. "Improved apparatus for the preparation of the cane-"trash, or 'bagass,' to be used as a fuel."

3rd. "Certain new processes for the clarification of saccharine "solutions."

The first process is called "the high-pressure clarification," and relates to the complete coagulation of "the vegetable albumen "contained in a saccharine solution, without at the same time "increasing the density," by heating the solution in a close vessel.

The second process consists in employing galvanic electricity "to present the base of a salt in a nascent state to the impurities "of a saccharine solution without the aid of an alkali or alkaline "earth, or without using an excess of the alkali." Having placed

the saccharine solution in a suitable open vessel, and dissolved the clarifying salt in it, the positive platinum electrode of a galvanic battery is placed in a porous vessel (in the saccharine solution), containing a solution of the clarifying salt, the negative electrode being placed in the saccharine solution. The electric action causes the acid of the clarifying salt to proceed to the porous cell, and its base to the negative electrode, there to combine with the impurities; or each electrode may be placed in a porous cell; or a series of electrodes, in the solution, may be included in the electric circuit.

Third process.—To separate an oxide or salt (that has been used for clarification) from a saccharine solution, a phosphate of lime filter is used in connection with an electric current, generated by pairs placed in the filter, the positive metals being in porous cells.

Fourth process.—In the ordinary clarification by animal charcoal, by connecting the insulated metal vessel containing the animal charcoal with the positive plate of a galvanic battery, and a porous cell filled with acidulated water, and imbedded in the charcoal with the negative plate, a galvanic current is made to promote the combinations which cause clarification and decolorization.

[Printed, 1*s*. 6*d*. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 305; Mechanics' Magazine, vol. 50, p. 499; and Patent Journal, vol. 7, p. 79.]

A.D. 1848, December 2.—N° 12,352.

BAKEWELL, Frederick Collier.—"Improvements in "making communications from one place to another by means "of electricity," consisting of :—

1st. A "copying telegraph." Cylinders on the "transmitting" and "receiving instruments" are caused, by means of weights and fans, to rotate synchronously; on the transmitting cylinder is placed the writing to be transmitted on tin foil (either written with varnish or else with a metal point upon varnished tin foil); on the receiving cylinder is placed paper "thoroughly moistened with" muriatic acid, water, and "saturated solution of prussiate of "potass." An insulated iron point is moved over each of these cylinders by means of a rotating screw parallel to the cylinder, the point being fixed on to a nut thus caused to traverse the cylinder longitudinally. The current only passing through the transmitting and receiving instruments by means of the tin foil and moistened

paper respectively, the point of the receiving instrument marks the paper with parallel lines, except when the varnished writing of the transmitting instrument causes the current to cease, thus producing a copy of the writing on the tin foil of the transmitting cylinder. Several points, insulated from one another, may be used on the receiving instrument, by transmitting the current through them in rapid succession; there being a similar number of points on the transmitting instrument. To ensure synchronous movement of the cylinders, they rotate rather faster than is required, and are retarded at small periodical and adjustable intervals, by the keeper of an electro-magnet (brought into action by a local battery and pendulum), which rubs against projections on the cylinder. A slip of paper on the transmitting cylinder should be truly copied on the receiving cylinder. The instruments are started at the same instant by means of the keeper of an electro-magnet, in the telegraphic circuit, disengaging the fan of the receiving instrument when the transmitting instrument is put in action.

2nd. A mode of "breaking and renewing the electric circuits "at distant stations." The deflection of the needle is made to bring into action an electro-magnet (magnetised by a local battery) which releases a detent from a rotating cylinder completing the circuit. The speed of the telegraph instruments may be regulated in this manner. By a similar means branch lines may be thrown into or out of circuit from a distant station. The earth circuit is completed when required by an insulated wire in the cylinder. One cylinder must be used to each branch.

[Printed, 1*s*. 8*d*. See Repertory of Arts, vol. 14 (*enlarged series*), p. 65; Mechanics' Magazine, vol. 50, p. 544; Patent Journal, vol. 7, p. 106; and Engineers' and Architects' Journal, vol. 12, p. 217.]

A.D. 1849, February 16.—N° 12,482.

PEARCE, CHARLES THOMAS.—"Improvements in apparatus "for obtaining light by electric agency," consisting of:—

1st. An electric lamp, in which motion is given to two carbon electrodes by means of suitable clockwork. One electrode is "disc" shaped, "at an angle of 45°" to the other, and is made to rotate on its axis so as to continually present a fresh "edge or "side surface" to the other electrode, which is "a bar of carbon" made to travel upwards by a uniform movement. The current is supplied to the electrode near the light, by means of "platinum

"wires" pointed with "iridium." Two or more disc or bar electrodes may be used.

Also an apparatus in which the electrodes are forced forward by means of weights or helical springs, the lower electrode being kept continually in contact with lateral bars of "non-conducting "carbon," and the upper electrode being forced into an earthen cone. Methods of joining electrodes are described, by inserting a piece of carbon into holes in the electrodes to be joined, &c., and of constructing electrodes, by the insertion of "conducting "carbon" into pieces of "non-conducting carbon" by means of a groove.

2nd. An apparatus to restore contact between the electrodes when the light goes out. An electro-magnet, included in the circuit, has a helical spring and keeper fixed at the end of a lever; "a piece of carbon" is thereby introduced between the electrodes when the current ceases, but is moved away as soon as the magnet acts.

3rd. A regularly intermittent electric light, obtained by transmitting the electric current through springs pressing against an inlaid metallic cylinder fixed on the arbor of a clock, and revolving with it. "A like apparatus is used" to bring two batteries alternately into action.

4th. An apparatus for regulating the electricity applied to lighting. A fixed electro-magnet or coil, in the circuit, deflects a permanent magnet mounted on an axis connected by wheelwork to the electrodes.

5th. "Perfluent" batteries. "The fluids are supplied to each "cell at the same time." The battery cells are contained in a trough, which has entrance and exit cells to the battery cells, the heavier fluid going out at the bottom, and the fresh fluid being supplied at the upper part. In a double-fluid battery, the acid solution is supplied at the top and goes out at the bottom, and the metallic solution comes in at the bottom and goes out at the top. "Each set of plates," being bolted to longitudinal wooden bars, are able to "be removed at once." When porous diaphragms are used, they "form part of the trough."

[Printed, 1*s*. 10*d*. See Repertory of Arts, vol. 14 (*enlarged series*), p. 193; and Mechanics' Magazine, vol. 51, p. 189.]

A.D. 1849, March 14.—N° 12,523.

FONTAINEMOREAU, PETER ARMAND le Comte de (*a communication*).—"Certain improvements in coating or covering "metallic and non-metallic bodies," relating:—

1st. To aqueous solutions for electro-depositing metals and alloys. The following is a list of the chemical substances in these solutions:—For *gilding*, a gelatinous precipitate, made by adding chloride of gold to "a solution of soap made of Gayac pitch," and caustic potash or soda; also, a salt of gold, caustic potash or soda, sulphate of potash or soda, and sugar. For "*platising*," phosphate of potash or soda, and "bichloride of platina and potassium." For *silvering*, a salt of silver (preferably the carbonate), carbonate of ammonium, and carbonate or bicarbonate of soda or potash. For *coppering*, carbonate of copper, and carbonate or bicarbonate of soda or potash; also, "cyamure" [cyanide?] of potassium, and a salt of copper ("preferably salt of cyamine" [cyanide?] "of cop-"per"). For *brassing*, carbonate of ammonium, and a salt of zinc ("preferably salt of carbonate of zinc"); also, a mixture of either of the coppering solutions with the carbonate of ammonium and carbonate of zinc solution. For *tinning*, caustic potash or soda, and protochloride or chloride of tin. For coating with *lead*, caustic potash or soda and litharge or other compound of lead.

All the above solutions "do not disengage any injurious smell or "gas, and are entirely free from any poisonous substance," except the second coppering solution and the tinning solution.

In depositing lead and tin upon iron or zinç, and tin upon lead, a preliminary coating of copper or brass is given.

2nd. To aqueous solutions for coating metals and alloys with other metals and alloys, "by immersing them in certain solutions."

[Printed, 4*d*. See Mechanics' Magazine, vol. 51, p. 284; and Patent Journal, vol. 9, p. 55.]

A.D. 1849, March 19.—N° 12,526.

RUSSELL, THOMAS HENRY, and WOOLRICH, JOHN STEPHEN.—"Improvements in coating iron and certain other metals "and alloys of metals," consisting of:—

1st. "The application of cadmium and its alloys for coating "the surfaces of iron and certain other metals and alloys of "metals."

" By means of electric deposition." The solution used is made by precipitating a carbonate of cadmium from the nitrate by the addition of a solution of carbonate of soda, and dissolving the precipitate thus obtained in cyanide of potassium solution in excess. A modification of this solution may be used, in connection with a suitable dissolving plate, to deposit alloys of cadmium.

A method of coating metals with cadmium and its alloys, by immersion in "a melted bath of the coating metal" is described.

A method "of applying cadmium or its alloys as a means of pre-" serving iron and other metals, by applying such metal in con-" tact, by mechanical or other means, in like manner to what zinc " has heretofore been applied," is also described.

2nd. Electro-depositing copper in alloy with other metals. The solution used is made by dissolving acetate of copper, acetate of zinc, acetate of potash, and benzoate of potash in hot water, and adding "as much cyanide of potassium in solution as will dis-" solve the precipitate, which is caused on adding it," and about one-tenth more. " Other metals may be alloyed with copper, and " the mode of proceeding is like that above described.

[Printed, 4d. See Repertory of Arts, vol. 15 (*enlarged series*), p. 163; Mechanics' Magazine, vol. 51, p. 285; and Patent Journal, vol. 9, p. 70.]

A.D. 1849, March 26.—N° 12,534.

PARKES, ALEXANDER.—" Improvements in depositing metals."

Electro-depositing different metals (copper, silver, tin, bismuth, and lead are mentioned) "in successive layers" upon manufactured iron or other metal, to protect it "more perfectly than a " separate coating thereon of either of the metals separately."

Various improvements in the manufacture, treatment, and working of certain metals and alloys are described, and a blowing machine is described and shown (Letters Patent N° 12,325 are referred to in this part of the invention).

In respect to "the manufacture of rollers for printing pur-" poses;" "a roller or cylinder of iron, of brass, or of white " metal, composed of tin, lead, zinc, and antimony, in various " proportions" has given to it "a copper surface by means of " electric deposition, employing the well known solutions of " copper for this purpose; but if composed of iron or white " alloy," the solution of copper in cyanide of potassium used hot

is preferred; the rollers or cylinders being "placed in a horizontal "position," and kept "in constant motion during the time the "deposition takes place."

[Printed, 6d. See Repertory of Arts, vol. 14 (enlarged series), p. 361; Mechanics' Magazine, vol. 51, p. 399; and Patent Journal, vol. 8, p. 49.]

A.D. 1849, April 16.—N° 12,567.

SHEPHERD, Charles.—"Improvements in working clocks "and other timekeepers, telegraphs, and machinery by elec- "tricity."

The improvements in electric clocks relate to:—

1st. "The escapement or mode of giving the impulse to the "pendulum balance or other regulator." The said impulse is given by a remontoir spring "wound up and actuated by electro- "magnetism, and retained by a detent." On the completion of the electric circuit, a "bar magnet," supported by a spring and carrying a lever, is caused to oscillate, thus winding up the remontoir spring by means of the pin on the lever, and causing it to slip under a detent. The pendulum rod carries two pallets, the foremost of which raises the detent, and the other receives the impulse of the spring. The circuit is completed by means of a spring carrying a "platina" pin, against which the pendulum strikes at the extremity of its vibration to the left; thus the remontoir spring does not interfere with the motion of the pendulum to the right, but is only released at the extremity of that vibration, and acts during a part of its vibration to the left. The pendulum is thus merely a measurer of time and a circuit break, and the amount of force imparted to it is independent of the battery power. When the remontoir escapement acts by a weighted arm, the arrangement is similar.

2nd. "The mode of actuating the train." Two pair of horse-shoe electro-magnets, round which the current traverses in alternate directions, oscillate two "bar magnets," to whose axis a pair of pallets, working a pallet wheel and thence the clock train, are attached. The pendulum strikes against a right-hand spring as well as a left-hand one, thus completing the circuit of one battery to give the electro-magnets one polarity, and of another battery to give them the opposite polarity.

3rd. "The striking or marking audibly the hour." The mode of actuating the train described under the 2nd head is employed. Various circuits are completed by the train so as to release and give motion to an ordinary locking plate and ratchet wheel, and the bell is struck accordingly by a hammer on the axis of the ratchet-wheel pallet. Once every hour a pin on the minute-hand axis raises an arm into contact with a pin on the seconds wheel, thus completing the circuit of a battery and electro-magnet, which action releases the locking plate, and completes a circuit of another battery and electro-magnet so far as to enable the "bar "magnet" of the clock-train electro-magnets to entirely complete the circuit every double vibration of the pendulum, by which arrangement the bell is struck and the locking plate moved forward. When the spring again enters the locking plate, the latter circuit is no longer able to be completed, and the striking ceases.

The following improvements are also set forth in this Specication :—

"A mode of working and breaking the circuits," obviating to some extent the oxidation of the platinum points. A weight, hung inside a sealed glass tube, fixed to the pendulum rod from a point of suspension "in a line with the centre of motion of the pen"dulum rod," makes contact alternately with platinum break points introduced through the sides of the glass. The wires are connected as described under the 2nd head. The glass vessel may may either be exhausted, or contain hydrogen or other suitable gas.

A chronometer, in which the maintaining power is "received "from electro-magnets," and regulated by a balance actuated by means of the remontoir escapement. Electro-magnets attract bar magnets, as in the 1st improvement in electric clocks, thereby winding up a remontoir spring and locking it under a detent, the circuit is then broken and the remontoir spring released by a discharging pallet and discharging spring, the various parts then come into their original position; pallets are fixed on the axis of the bar magnets which give the motion, thus regulated, to a pallet wheel, and thence to the train.

"An improved escape wheel and pallets," for giving a step-bystep rotation to timekeepers and telegraphs. The friction of the pallets at the time of driving is lessened by the pallet arm carry-

ing two driving pallets, acting alternately one on each side of the wheel axis, and two detents, one to each pallet.

Where great power is required for striking the hours, a series of small electro-magnets are used in preference to using a few electro-magnets above a certain size.

[Printed, 2s. See Mechanics' Magazine, vol. 51, p. 382; and Patent Journal, vol. 8, pp. 43 and 46.]

A.D. 1849, April 17.—N° 12,575.

ALLIOTT, ALEXANDER.—This invention relates to the following improvements:—

"Improvements in apparatus for ascertaining and registering" the force and direction "of wind, both natural and artificial."

"Improvements in apparatus for ascertaining and registering "the force or pressure of water."

"Improvements in apparatus for registering the pressure of "steam."

"Improvements in apparatus for ascertaining and marking or "registering the weight of substances."

"Improvements in apparatus for ascertaining and registering "the velocity of carriages."

"Improvements in apparatus for ascertaining under certain "circumstances the length of time elapsed after a train of carriages "has passed a given place."

"Improvements in apparatus for enabling the place or direction "of floating bodies to be ascertained."—Photographically-sensitive paper is passed under the compass needle from a supply drum to another actuated by clockwork. The paper is marked longitudinally with five lines; the centre line indicates a N. or S. course; the outside lines, an E. and W. course respectively; and the two intermediate lines. a N.W. or S.W., and N.E. or S.E. course respectively. "The compass card has two small holes" "of different sizes, pierced through it, and the paper" "is marked by "the light passing through the two holes in the compass card, "the smaller hole being placed on the west side of the larger hole. "The thin line will be marked on the west side of the thicker line "from north-west to north-east, and on the east side from south-west to south-east." A separate scale must be employed to measure the straight part of the lines marked on the paper, "to

at the receiving stations have completed their motions. Or the slide may be dispensed with at the receiving stations; the line-wire circuit need not then be interrupted. Instead of the transmitting instrument sending alternately positive and negative currents, the motion of the armature tail may alternately transmit and cut off the current by acting on a suitable slide; in this case only one electro-magnet and a reaction spring (in the line-wire circuit) are required; a self-acting reciprocal motion is thus produced by the armature tail, a pendulous body; and no second current can be sent until each instrument has completed the work due to the prior current.

13th. "Conducting away atmospheric electricity from telegra-" phic wires to the earth." A rod or wire in, say, the down line wire, wrapped with bibulous paper, is surrounded with metal filings in connection with the earth; the filings may also be connected with the up line wire, to defend the telegraph instrument more securely.

14th. Using the soluble sulphates of the earths for telegraph batteries. A combination of copper, alum solution, and amalgamated zinc is preferred.

15th. Using three metals, for instance, copper, iron, and zinc, for earth batteries, thus enabling currents to be sent in either direction. The iron plate is used as an earth plate at each end of the circuit, and at each station masses of the other metals are buried.

16th. "A self-acting electric telegraph for water companies," &c., to indicate, at one or more distant stations, the elevation of water at different times. Metal plates, connected with the self-acting instrument, are placed in the reservoir at the heights to be indicated by telegraph (say at every foot); a non-conducting revolving cylinder, with inlaid brass pieces, makes connection consecutively with the reservoir plates and line-wire circuit, at each completion of the circuit moving the indicator of a step-by-step telegraph forward one number, indicating feet. As many reservoir plates as are immersed thus complete the circuit, but those that are not immersed transmit no current. Before any reservoir plates are brought into the circuit, the indicator is brought to zero (See N° 12,039), by sending a reverse current from a second battery in the circuit, according to the 2nd improvement; thus the number of reservoir plates immersed, or the depth of water (in feet) in the

"sections or divisions," so that each of them "may be telegraphed "or signalled by means of the number of the section or division "to which it belongs, and the number or position of it in such "section." Examples of the application of this improvement to single and double pointer telegraphs are given.

2nd. Constructing "compound permanent magnets," either in one piece or in several pieces, to be used in connection with electric coils to deflect the pointers of telegraphs. The arms of these compound magnets may be arranged in pairs, to permit flat coils to be placed between similar poles, or so that the poles of an electro-magnet may be placed between dissimilar poles, or to act in conjunction with hollow electric coils; in the latter case, flat serrated pices of steel bent into a semicircular form are fixed on a spindle so as to have a collection of similar poles opposite to each other. In making these magnets the poles only are hardened, and to prevent the magnetizing of neighbouring poles from demagnetizing those already magnetized, keepers are placed across contrary poles.

3rd. A "revolving compound disc" for making, breaking, and reversing electric telegraph currents. Three insulated notched metallic discs are mounted on a spindle having a pointer, so that the notches are opposite the projections in the outer discs, and the intermediate disc has twice as many projections as either of the other discs. The outer discs are connected by springs with the battery poles, and the intermediate disc breaks the circuit; the telegraph circuit communicates with springs that press on all three discs at a distance apart equal to that between the centres of two projections on the outer discs.

4th. A "pole changer." A wooden lever mounted on an axis has insulated metal plates secured to it, which make contact with fixed pins in connection with the battery poles, according to the direction of its motion; at the same time a plate at the other end of the lever is drawn away from springs in the telegraph circuit.

5th. A "slotted frame" apparatus for "making, breaking, and "reforming or reversing" the telegraph current. A wooden frame has as many slots as letters of the alphabet; at the side of each slot inlaid studs are connected with one or other wires of the line circuit. According to the connections, width apart, and length of the studs, so is the direction, intermission, and duration of the electric current conveyed by means of a handle

with two insulated "semiglobular nozzles," respectively connected with a battery pole. Or the studs may be connected with the battery, and the nozzles with the line circuit.

6th. "An apparatus for giving motion to the pointer of a cir- "cular dial of an indicating telegraph." Two ratchet wheels fixed on the pointer axle are rotated by clicks mounted on a vibrating frame worked by a suitable electro-magnetic arrangement.

[Printed, 1*s.* 5*d.* See Mechanics' Magazine, vol. 54, p. 416; and vol. 55, p. 81.]

A.D. 1850, December 7.—N° 13,392.

MORTIMER, JOHN.—"Improvements in the magnetic needle "and mariners' compasses."

A card of a mariner's compass is described and shown, in which "the chief portion of the needle" is "on one side of the axis," the needle and card being balanced by "a portion of brass or other "metal not magnetic." "By this arrangement I find the mag- "netic needle of a mariner's compass comes more quickly to rest, "and I also find that the action of a needle is better." "I re- "commend the use of two compasses, the one having the south "pole most distant from the axis of motion, and the other having "the north pole most distant from its axis."

"Another mariner's compass" is described and shown, in which "in place of having the axis of the needle coincident with the "axis of the card, the axis of the needle is carried by a slide, "which can be moved in a groove to any point on the card (or "hemisphere) representing the latitude of the place of observation; "and if such instrument be fitted to sights, which may place the "pivot on which the needle traverses and the centre or pole of a "card in a direct line with the meridian, then, by adjusting the "index hand to the direction that the needle takes, the variation "of it will be at once shewn."

A dipping needle is also described and shown, which is suspended by "an universal joint;" the loop by which the instrument is suspended is connected to a ball by two axes in a half ring; another half ring, connected with the dipping needle and circle, is attached to the ball by axes at right angles to the other axes.

[Printed, 6*d.* See Repertory of Arts, vol. 18 (*enlarged series*), p. 83; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 289; Mechanics' Magazine, vol. 54, p. 478; and Patent Journal, vol. 11, p. 136.]

A.D. 1850, December 27.—N° 13,427.

DERING, George Edward.—" Improvements in the means of " and apparatus for communicating intelligence by electricity," consisting of:—

1st. " Supporting moveable magnets and other similar telegra- " phic arrangements acted on by electric currents " by elastic supports, whether magnetic or not; or elastic magnets, fixed at their upper ends, may be used.

2nd. Methods of restoring magnetic needles, &c., to rest, by applying the force of gravity. The centre of gravity is placed immediately below the centre of motion, thus employing the principle of the quick beat of a short pendulum. The following are applications of this principle:—A weight is placed immediately below the centre of motion; the needle is suspended by its upper end by resting the axis in an angular aperture; the needle is suspended from an angular aperture at its upper end by a hook of round wire; and suspending the needle entirely by magnetic attraction, its upper end being rounded for that purpose, and working in an angular groove.

3rd. Applying electro-magnetic coils (with or without soft iron cores) to produce motion in magnetic needles, &c., by placing their axes parallel to the plane of motion of the magnetic body.

4th. " The sounding of telegraphic alarums " in such a manner as to prevent their ringing during the transmission of messages, although included in the telegraphic circuit. This arrangement is applicable to any telegraph in which two or more circuits are employed; the object is effected by setting aside any one particular signal to act on the bell apparatus, the alarum electro-magnets only releasing the clockwork when such currents pass as would produce the omitted signal, by suitably acting on moveable permanent magnets.

5th. " Transmitting secret intelligence to any one or more " stations " " without the use of extra wires." At each station a metallic disc, suitably inlaid with non-conducting portions, is brought to the required position in order to complete the circuit or not, by any electro-magnetic step-by-step movement, thus excluding or including the telegraph instrument at any particular station or set of stations as required. The disc arrangement is brought into action from a distant station, independent of the signal apparatus, by one of the following means:—One direction

of the current may be devoted to that purpose only; a stronger electric current may be used for the disc; or the current may be passed in one direction for several seconds, and affect the disc by the action of an electro-magnet upon a permanent magnet bringing and keeping an arm in contact with a revolving wheel until it will not return to its former position, except by reversing the current; at such time the arm acts on the disc.

6th. "Counteracting the effect of currents of atmospheric elec-" tricity upon telegraphic apparatus," by introducing into the circuit an opposing galvanic or other electric current of equal force; thus restoring the needle or other apparatus "to its ordi-" nary position of equilibrium."

7th. "Carrying off atmospheric electricity" from the line-wires. "A thin piece of linen" is interposed between two roughened or grooved metallic surfaces, one of which is included in the line-wire circuit, and the other is in connection with the earth.

8th. Carrying off atmospheric electricity from the line wires by the attraction or repulsion occurring between dissimilarly or similarly electrified bodies respectively., Metal balls are suspended from the line-wire circuit by wires, and on separating, make contact with plates connected with the earth; or the separation of suspended balls may break connection between the line wire and the instrument.

9th. Carrying off atmospheric electricity by introducing a strip of metallic leaf into the circuit, this being fused by the passing of the atmospheric electricity.

10th. Insulating suspended telegraph wires. An inverted bell of insulating material is attached to the post, and supports an exterior metal bell carrying the telegraph wire.

[Printed, 10*d*. See Repertory of Arts, vol. 18 (*enlarged series*), p. 65; Mechanics' Magazine, vol. 55, p. 16; Practical Mechanics' Journal, vol. 5, p. 129; and Patent Journal, vol. 11, p. 205.]

A.D. 1850, December 27.—N° 13,429.

ST. JOHN, John Ransom.—"Improvements in the construc-" tion of compasses and apparatus for ascertaining and registering " the velocity of ships or vessels through the water," consisting of:—

1st. "Improvements in the construction of compasses," by which any variation of the needle from the magnetic meridian, produced by local causes, may be at once seen, and its amount indicated. The new compasses are called "'self-determining

"'local variation compasses.'" Underneath the compass card, at right angles to the main needle, and between it and the card, a "cross bar" is fixed, which carries a "satellite needle" near each end, and at the same distance from the centre of the card. These satellites, by magnetic adjustment, are made to "stand "parallel with the main needle, with the north pole of each satel- "lite needle toward the south pole of the main needle, and *vice* "*versâ*." They are mounted on steel pivots, and have caps, each carrying a balanced index arm, which indicates the local variation on properly divided arcs near the centre of the card. When there is no local disturbance, the index arms point to the centre of the card, and deflect either way, according to the amount and direction of the disturbance. The arcs, or "sector scales," are graduated by deflecting the main needle, and marking the corresponding positions of the satellite needles. The "sector scale" on the east side has E at its northern extremity, and W at its southern (*vice versâ* for the west "sector scale"), to indicate the direction in which the local variation takes place. This variation is equal to half the sum of the variations on the scales. If both arms deflect in the same direction, the variation is equal to the difference of the angles shown by each pointer, and is in the direction of the greater angle.

2nd. An "aquatic velocimeter," to show the distance run by a ship at sea, and at what rate she is proceeding; also "an improved "geared hand log."

[Printed, 1*s*. 3*d*. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 249; and Mechanics' Magazine, vol. 55, p. 19.]

A.D. 1851, February 3.—N° 13,489.

NEWTON, Alfred Vincent (*a communication*).—"Improve- "ments in communicating intelligence by electricity," by which one wire is made to convey telegraphic messages to and fro between several persons in such quick succession of signals occupying so short a time in their use of the main conductor as to be nearly simultaneous.

A number of short wires, according to the number of signals to be transmitted and the number of operators using the instrument at once, communicate from the instrument at each station to the line wire or to the earth circuit. To apply this invention, two pendulums, vibrating synchronously at different stations (so as to be exactly in the same relative position at the

same instant of time), move in grooves, completing as many circuits as may be desired, and thus indicating letters of the alphabet by the circuit completed, according to the wish of the operator at the distant station; or several sets of letters of the alphabet, each belonging to a different operator, may be used. While one pendulum is passing over "signal-making wires," the other pendulum is passing over "signal-receiving wires." The indications may either be a spark, the deflection of a galvanometer needle in the circuit, or actuating a magnet or keeper, "from " which motion these signals may be perceived or recorded, and " printed in any convenient form." The synchronous movement of the pendulums, and the starting of them at the same moment of time, may be ensured by sparks arranged to occur at a given place in the arc of vibration, or by means of electro-magnets.

Several stations may be in communication by means of an analagous set of instruments to that above described, and any of the known forms of electricity may be used.

"The apparatus forming the subject of the present invention is " termed by the inventor an electrepode (*i.e.*) electric-word-road."

[Printed, 7*d*. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 86; Mechanics' Magazine, vol. 55, p. 136; and Patent Journal, vol. 12, p. 48.]

A.D. 1851, February 7.—N° 13,497.

DUMONT, FRANCOIS MARCELLIN ARISTIDE.—" Improved " means and electric apparatus for transmitting intelligence," consisting of :—

1st. " A particular combination of electric wires," and "system " of placing and fixing " them, "for the conveyance of intelligence " in the interior of large towns." In order that each house in connection with the telegraph (or each subscriber thereto) may communicate privately by direct means, a central station has connected with it a number of "corresponding" stations, each in the centre of a district, and connected with a certain number of houses. If any one subscriber wishes to communicate with any other, suitable signals are passed to the corresponding station, the central station, the corresponding station of the receiver, and the receiver's house; the requisite connections are then made to form a continuous circuit from the house of the transmitter to that of the receiver. To each house there is an electric apparatus at the house and at the corresponding station. Each corresponding

station has a battery, a "telegraph," a range of bells, a "worker" or attendant, and a "commutator." At the central station, a wire to each corresponding station has a bell and a small telegraph; according to the bell rung from the corresponding station, and the number on its small telegraph, the electric connections are made.

In another arrangement for the central station, as many complete telegraphic apparatus are established as there are corresponding stations; the despatch is sent from the corresponding station to the central station, and from there to the receiving corresponding station.

An arrangement of a central station is also set forth in which there are two distinct parts; one consisting of as many dials (with the alphabet and numerical series) as there are stations, "to trans-" mit the dispatches of the corresponding stations;" the other of as many "small communicators," and half as many larger "com-" municators," for establishing direct communication; the smaller communicators break contact with the dial; the larger communicators have the wires from each station passing through the numbers attached to them, and complete direct communication by moving the hand accordingly.

2nd. An arrangement for giving notice of the outbreak of a fire in the interior of large towns. A central station communicates telegraphically with each street or square by an electric signal; a spring completes the electric circuit with the central station, and rings one of a number of bells, or one bell a number of times, corresponding to the locality requiring aid.

3rd. "Electric bells and alarums, applicable to the prevention " of robberies or fires." These are an improvement on N° 11,762 (which see), and may be applied to protect doors, windows, &c., to ring a number of bells corresponding to any number of different places, and to communicate "between any two places connected " by two conducting wires." A plate of soft iron is attracted to the electro-magnet when the electric current passes, and releases the clockwork detent, by which the hammer is caused to strike the bell; every time the hammer gives a stroke, a small lever connected with its rod strikes on the plate of soft iron, and brings it back to its first position. A simpler apparatus (without clockwork) consists of an electro-magnet and armature lever, to one end of which the bell is attached, which breaks and makes electric contact, according as the lever is attracted to the magnet or not.

4th. "A system of keys and pedals" for working the transmitting apparatus. This is "applied to Bregnet's" [Breguet's?] apparatus, "which is composed of a dial bearing the series of the "letters of the alphabet." Instead of transmitting all the intermediate signs to the indicating apparatus, the lowering of a key determines "a corresponding motion of the sign represented by "the key;" this is accomplished by giving the dial a constant tendency to rotary motion, and having a number of small levers (one to each key). The depression of a key puts one lever in the way of a stop on the dial. When the instrument is at rest, the lever belonging to the blank space stops the dial, but is released on the pressure of a key, a bar passing under all the keys for that purpose.

5th. Fixing submarine electric wires. The wire is supported away from the bottom of the sea by rods projecting downwards from buoys at various intervals; some of the rods are anchored to the bottom of the sea; the wire is attached to the first buoy, and passed over a post to avoid the friction on the coast.

[Printed, 2s. 3d. See Mechanics' Magazine, vol. 55, p. 137; and Patent Journal, vol. 12, p. 51.]

A.D. 1851, February 17.—N° 13,513.

COWPER, Charles (*a communication*).—The title of this invention is, "Improvements in moulds for electro-metallurgy;" and "the invention consists in an improved mode or modes of "forming moulds of elastic or glutinous substances, and ren- "dering them better conductors of electricity by introducing "good conducting materials in the process of forming the "moulds."

"The substances employed to form the moulds are gelatine or "glue, gutta percha, caoutchouc, or other similar elastic or glu- "tinous substance."

To operate with gelatine or glue, the model is oiled on its surface, placed in a box, and has its surface covered with fine wires, "the ends of which are allowed to project;" "the case is then "filled with the melted gelatine or glue, and allowed to remain "until the gelatine has become cool and solid;" the model is removed, and a mould is thus obtained, "with a number of fine "wires" imbedded in the truly-shaped surface; this surface is then covered with plumbago, and the remainder with grease, to

resist the action of the depositing solution; it is then ready for electro-deposition.

In operating with gutta percha, it is softened by heat, mixed with naphtha or other solvent, and spread out on a sheet of glass so as to form a sheet; this is placed over the wire-covered model, subjected to the heat of a stove, taken out, "the gutta percha "pressed in contact with the model, and allowed to cool;" it is then treated in a similar manner to the gelatine mould above described, and is ready for electro-deposition.

Caoutchouc is softened by a solvent, "and treated in a similar "manner to the gutta percha; or it may be applied to the model "in the state of a thick solution, laying on several coats, and "allowing each to dry before adding another, until a sufficient "thickness of mould is obtained. Gutta percha may also be "similarly applied in a state of solution."

[Printed, 3d. See Mechanics' Magazine, vol. 55, p. 158; and Patent Journal, vol. 11, p. 279.]

A.D. 1851, February 28.—N° 13,536.

MILLWARD, WILLIAM.—"Certain improvements in electro-"magnetic and magneto-electric apparatus," consisting of:—

1st. "A new mode of charging or magnetizing iron and steel "bars, to be used either as permanent magnets or electro-mag-"nets." This is effected by using "an electro-magnet formed "by a current produced from a magneto-electrical machine, in-"stead of the current produced from a voltaic battery as here-"tofore." The magneto-electric machine preferred consists of magnets of "the U" or horseshoe form, with all the north poles ranged on one side and the south poles on the other; the commutator acts upon all the magnets "at the same instant, so that "the current of electricity always passes in one direction," and the whole magnetic surface is "in combination at one time."

2nd. Two "new forms of magneto-electrical machines."

In the first, the armatures may revolve either between the poles of horseshoe magnets "or in face of them." Instead of the permanent horseshoe magnets being of steel, they are of cast iron, or of soft iron, with steel magnets placed on or around them out of the influence of the armatures.

The second machine consists of a fixed horseshoe permanent magnet and a revolving "commutator" of soft iron, with a brass

centre between the permanent magnet and fixed coiled "arma-" tures." [The "commutator" would here appear to be also a keeper to the permanent magnet.]

[Printed, 6*d*. See Repertory of Arts, vol. 18 (*enlarged series*), p. 199; Mechanics' Magazine, vol. 55, p. 198; and Patent Journal, vol. 11, p. 267.]

A.D. 1851, March 14.—N° 13,555.

LITTLE, George.—" Improvements in electric telegraphs, and " in various apparatus to be used in connection therewith, part of " which improvemts are also applicable to other similar pur- " poses," relating to:—

1st. " Suspending the indicators or other parts of electric tele- " graphs that may be desirable by means of magnetic attraction." An "indicator" is shown inside a tube containing alcohol, suspended from the pole of a permanent magnet fixed into a socket at the top of the tube. On each side of the tube are coils of wire, included in the telegraphic circuit, which deflect the indicator in one direction or the other, according to the direction of the electric current, " thereby producing any number of conventional signals, " the use of the spirits in the tube being to act as a continuous " lubricator by preventing the indicator from sticking against the " sides of the glass tube, which act as stops to the same."

2nd. " The supporting of indicators of electric telegraphs by " means of floats made of blown glass or of other suitable " buoyant material, such floats being enclosed in glass tubes " containing any suitable fluid." The "indicator" consists of a " magnet" attached to a float, by which it is suspended in a glass tube containing "spirits or any suitable fluid;" this is placed in the axis of a coil of wire included in the telegraphic circuit, and upon the passage of the electric current, the " magnet is acted " upon and drawn down into the tube, carrying with it the float " out of sight or nearly so, thereby producing conventional " signals."

One or more of either of the above arrangements may be fixed to the dial plate of the telegraph instrument.

[Printed, 5*d*. See Repertory of Arts, vol. 18 (*enlarged series*), p. 354; London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 87; Mechanics' Magazine, vol. 55, p. 256; Practical Mechanics' Journal, vol. 4, p. 181; and Patent Journal, vol. 12, p. 3.]

A.D. 1851, March 17.—N° 13,558.

MINTON, Herbert, and HOFFSTAEDT, Augustus John (*partly a communication*).—"Improvements in the manufacture of "faces or dials" for "*mariners' compasses*," "*electric telegraphic* "*apparatus*," &c.

Dials are manufactured of porcelain or earthenware in the following ways:—

By pressing plastic clay into moulds, or by throwing the shapes on the wheel and afterwards turning them down in the lathe, then submitting them to the drying and firing or baking process in the usual manner.

Or the "slabs or shapes may be produced by the dry powder "process," that is, "by pressure from powdered clay or powdered "minerals" (See Printed Specification, N° 8547).

The graduations, figures, or patterns are given to the slabs in the following ways:—

By printing them on paper in the same way as patterns for earthenware or china are printed, and "transferring them to the "bisque," which is prepared, glazed, "and passed through the "glost oven."

Or the slabs "are first glazed and passed through the glost "oven," and then receive the pattern by printing; they are then passed through the enamelling kiln.

Or the device may be obtained and applied "under the surface "printing process" (See Printed Specification, N° 12,097).

Or the device may be pressed into the clay before the article is baked or fired, the indentations being filled up with liquid clay or a slip of one or more colours; after firing, the article may either be glazed or not. This process is used in the manufacture of encaustic tiles (See Printed Specification, N° 5890).

[Printed, 3*d*. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 109; Mechanics' Magazine, vol. 55, p. 257; Artizan, vol. 9, p. 283; and Patent Journal, vol. 11, p. 303.]

A.D. 1851, May 3.—N° 13,613.

GREENOUGH, John James (*a communication*).—"Electro-"dynamic axial engines." The application of electro-dynamic helices and "axial bars" to the generation of motive power by means of the tendency of an electro-dynamic helix to draw a magnet within it. A hollow bar of soft iron is made to traverse the

interior of a series of helices, which are magnetized in succession by the break or "cut-off." The same number of helices are always kept in action, and are called the "helix of operation." The "cut-off" is parallel to the path of the "axial bar;" it consists of "metallic springs" moving over the terminals of the coils, and communicating the electric current thereto, the "metallic springs" being fixed to the moving "axial bar." To obviate the effects of the spark, the faces of the "cut-off" are removeable. Examples of the application of this principle to rectilinear reciprocating, vibrating, and rotary engines are given. "Square" or "rectangular" wires for the coils (insulated with strips of cloth, &c. attached with adhesive material to two or more contiguous sides of the wire), and wedge-shaped pieces of wire at the ends of the helix, are preferably used; these pieces ("risers") are in metallic contact with the coil. The conducting wire of the helices increases in size from within outwards. The repulsive force of the electro-magnetic coil may be used either alone or in connection with the "axial force" by means of an iron tube fixed in the coil, the polarity of the "axial "bar" and of the iron tube being similar. A pumping engine is described and shown, in which the helix is lined with a thin brass tube, and the "axial bar" is packed as usual for pistons; a "repulsion tube of iron" may be used instead of the brass tube, or in connection with it. "Auxiliary helices" are used to keep up the magnetism of the "axial bar," except when one pole is always magnetized by the induction of the coil. "Outside helices" are used on the rotary engine where friction rollers, &c. interrupt their continuity.

This invention also relates to the following improvements in the construction of galvanic batteries. To join the platinum plate to the zinc plate, a slit is made in its edge, into which the platinum plate is inserted and fixed by pressure or otherwise. Carbon plates are made by placing sheet iron plates in the retorts of gasworks, upon which the carbon deposits, a portion, for attachment to the zinc plate, being covered with clay. The whole battery cell is made in one piece of unglazed earthenware, one side of the interior cell being identical with that of the outside cell; the outside is soaked in hot varnish, oil, or bituminous or resinous matter. The zinc plate for this battery surrounds the porous cell, and is U-shaped. The platinum plate is made to envelope entirely a stout copper wire, and is soldered to it; this is bent down, and

makes connection with the zinc in the next cell by means of a glass tube, with mercury at the bottom, which is in contact with the zinc plate.

Details of the exact principles of action, construction, and advantages of the above improvements are stated in the Specification, and shown in the Drawings.

[Printed, 1*s*. 9*d*. See Mechanics' Magazine, vol. 55, p. 394, and vol. 56, p. 21; and Patent Journal, vol. 12, p. 142.]

A.D. 1851, May 3.—N° 13,619.

FONTAINEMOREAU, Pierre Armand le Comte de (*a communication*).—"Certain improvements in electric telegraphs," consisting "in the application of" [to?] "electric telegraphic ap-" paratus of a keyboard similar to that of a pianoforte, in conjunc-" tion with a toothed cylinder, combined with a ratchet wheel and " levers put in motion by keys or hammers, by means of which " it is merely requisite to place the finger upon a series of keys " on which signs, letters or numbers are written to effect the " transmission of intelligence."

Under the keyboard, and parallel to it, "a steel cylinder," or shaft, is placed, having rods radiating from it, one to each key, and fixed in a helical line. The shaft has at one end a ratchet wheel, which prevents the clockwork attached from causing it to revolve until one of the keys are pressed down, when a click is removed from the ratchet wheel by means of a bar passing under all the keys that works on a centre in the box of the instrument; the shaft is thus enabled to revolve until the rod belonging to the depressed key meets with the catch under the key. If an electric circuit is opened and shut every time one of the teeth of the ratchet weeel passes the click, a hand to a telegraph dial, included in the circuit, will be enabled to point to as many signals as this apparatus has keys. A self-acting means of winding up the clockwork is described, consisting of the movement of a ratchet wheel fixed to the wheelwork by a ratchet, set in motion by the longitudinal bar every time a key is pressed down, thus winding up the clockwork.

[Printed, 6*d*. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 104; Mechanics' Magazine, vol. 55, p. 393; and Patent Journal, vol. 12, p. 77.]

A.D. 1851, May 29.—N° 13,645.

ADAMS, Henry W.—"An improved means of generating galvanic electricity, of decomposing water or various electrolytes, of collecting hydrogen, of burning it or atmospheric air separately or in combination."

This invention consists of the following parts:—

1st. A galvanic battery, constructed "so as generate as nearly as possible from a given weight of metal the greatest possible quantity of electricity, and give to it the greatest degree of intensity." To obtain the greatest quantity of electricity, "any given weight of electro-negative metal proposed to be used in a single cell" is made to "present the greatest possible amount of magnetic surface or surfaces within the smallest amount of space opposite to the electro-positive metal. To obtain the greatest degree of intensity the battery should be so constructed that the surface or combined aggregate of surfaces of the electro-negative metal shall be presented opposite to the electro-positive metal in an insulated coil or coils of the smallest diameter, which will conduct the quantity of the electric current proposed to be generated without melting the coils." The surface of negative metal is therefore much larger than that of positive metal, and "should be distributed in sections or parts (connected together), equal or about equal in dimensions to those of the positive surface." Between the coils and the zincs there is only a thin sheet of exciting liquid or "electrolyte." The insulation of the negative surface, wires, &c., is such as to "protect their surfaces from contact with the liquid of the cell, or from any metallic deposit which might coat them and interfere with their action." In the Specification it is further stated that when the above "electrical instrument" is used "as a galvanic battery," the wires, &c. are not insulated; but in all cases in which it is used "as a helix for the production of motive power," "the bundles or faggots of metal" are insulated so that "the current" may render the coils magnetic.

A battery made upon the above principles is applied to generating hydrogen gas by connecting its poles, and placing it in a cistern of acidulated water under an inverted vessel, to collect the gas; this cistern is also fitted with a tube to conduct the hydrogen gas to a gasholder, a supply pipe to convey acidulated

water from a supply cistern, and a waste syphon to take away the water charged with "sulphate of oxide of zinc."

2nd. Obtaining gas from the decomposition of water by heat.

3rd. "Increasing the heating power of hydrogen or other gas."

4th. "The mechanical construction and arrangement of a ves-" sel" in which air or gas can be impregnated "with the vapor " of any volatile hydrocarbon, as alliole" [allyle?], "benzole, " pyroxilic spirit, acetone, or other analogous burning fluids."

5th. "The construction of burners suitable for the combustion " of the benzolized air."

6th. "The construction of platinum, palladium, or other ana-" logous metallic cones," &c., to be applied to the burners of the benzolized air.

7th. Apparatus for supplying a constant current of air to the burners of the benzolized air.

[Printed, 1s. 2d. See Repertory of Arts, vol. 18 (*enlarged series*), pp. 305 and 368; Mechanics' Magazine, vol. 55, p. 456; and Patent Journal, vol. 12, p. 131.]

A.D. 1851, June 12.—Nº 13,660.

CHATTERTON, John.—"Certain improvements in protecting " insulated electro-telegraphic wires, and in the methods and " machinery used for the purpose."

This invention "consists in an improved arrangement of " machinery whereby leaden tubing is as fast as produced so " lowered in temperature as to be brought over the gutta percha " covered wire without injuring the gutta percha." "A hydraulic " lead-pipe-making machine of the ordinary description" is used. The core of the lead tube is connected by "a thin wire" to the " gutta-percha-covered wire," both being supported on a framing containing rollers; it is passed through a trough of water, and has a chain or cord attached to it as soon as it reaches the "gutta-" percha-insulated wire," "by which it is easily conducted over " the insulated wire." When any given length of the insulated wire is covered, "it is cut off and passed through a die or set of " grooved rolls;" it is then wound on a drum, which is removed when it is full, "an empty one substituted for it and so on." To join the lengths, the lead is cut away, and the exposed ends of the wires tinned, twisted, and soldered; the gutta percha is then

made good to the same size as the tubing, and a collar soldered over it by means of some fusible alloy. The tubing may be exposed to "a current of cold air;" and it may be drawn to the required length over a plain wire for the "gutta-percha-covered "wire" to be drawn through it; but the first-mentioned way is preferred. Several wires insulated with gutta percha independently, and then twisted together so as to form a rope, may be covered with lead by the above process.

[Printed, 6d. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 195; Mechanics' Magazine, vol. 55, p. 500, also vol. 56, p. 131; and Patent Journal, vol. 12, p. 135.]

A.D. 1851, July 3.—N° 13,681.

KEMP, George.—"A new method of obtaining motive power "by means of electro-magnetism."

"A series of electro-magnets are caused to act in succession by "their armatures on the same bar or instrument;" and by such bar, motion is given "to fluids in order to obtain and communicate "motion thereby." The armatures of several electro-magnets are fixed to stems of different lengths that are free to slide through the above-mentioned bar, but have heads which take hold of the bar in succession, and draw it through sufficient space to bring the next armature under the influence of its electro-magnet. The electro-magnets are magnetized in succession, those whose armatures have the longest stems first, then decreasing, to the armature with the shortest stem; by this means a length of stroke is obtained equal to the sum of the distances through which each magnet attracts its keeper.

The power thus obtained is made available by connecting two such bars as cross-heads to the piston rod of a cylinder containing water or other fluid; the piston rod passing completely through the cylinder, and one bar being in connection with one end, the other bar with the other end of the piston rod. This cylinder is short, but of large diameter, and communicates by suitable passages with another similar "cylinder of less diameter, but of "proportionably greater length," from which cylinder the power is applied by means of a piston rod, &c. The action of this apparatus is "the reverse of that in Bramah's press," as it acts by forcing the water from a short cylinder of large diameter by electro-magnetic power into a long cylinder of small diameter, thus

obtaining a longer stroke than could be obtained by means of the electro-magnets only.

[Printed, 4d. See Repertory of Arts, vol. 19 (*enlarged series*), p. 105; and Mechanics' Magazine, vol. 56, pp. 38 and 481.]

A.D. 1851, July 22.—N° 13,698.

DUNDONALD, THOMAS, Earl of.—The application "of the "bitumen, petroleum, or natural pitch of Trinidad, and of the "British North American colonies," to manufacture "useful and "ornamental objects." The method of manufacturing pipes, sheets, tanks, ornamental articles, bituminous cloth, sewers, drains, waterways, submerged foundations, and nearly water-tight mountain channels is described.

The following methods of covering and insulating *electric telegraph wires* are also set forth:—The wire is passed through a melted "flexible description" of bitumen, then through a "die or "orifice" to "deprive it of all the superfluous bitumen," then "through water," or (in preference) "an emulsion composed of "water and clay, or water and lime," so as to "deprive the surface "of the bitumen of its adhesive qualities, and cool it;" or the wire may be coated with some "filamentous material," then passed through naphtha, &c.; or it may be covered by a filamentous material "previously saturated with melted bitumen," and the wire passed "through a heated die or orifice." When several wires are to be encased, a thick covering "of flexible bitumen" is put upon a core of hempen rope, "small longitudinal grooves" being made in the surface of the bitumen by a suitable die, along which the wires are laid; a sheet of plastic bitumen is bent transversely round the rope and wires, and united longitudinally, by fusion, by a solution of bitumen, or in any other suitable manner, thus forming a case for the wires: the ends of the cases may be joined together by interposing a heated metal plate, or by means of melted or liquid bitumen.

[Printed, 10d. See Repertory of Arts, vol. 19 (*enlarged series*), p. 289; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 186; and Mechanics' Magazine, vol. 56, p. 98.]

A.D. 1851, August 14.—N° 13,716.

DERODE, AIMÉ NICHOLAS.—"A certain process for uniting "cast iron to cast iron and other metals, and for uniting other

"metals together." "Either magnetic or electro-galvanic" electricity is used "conjointly with the ordinary process employed for "scouring, and with the addition of heat obtained from ordinary "combustibles." The following are the processes described:—

1st. The metals are scoured in a dilute muriatic acid bath, either being "in contact with the decomposing pole of the battery," or submitted to a series of shocks. When the pieces come out of the bath they are brightened with a suitable scraper. Cast iron submitted to this process parts with its carbon, which is left in the cleansing water.

2nd. "When the metal is at a red heat and the pieces to be "united are in a solid state," "electric shocks" are given (in the case of cast iron), "to produce a more copious and rapid evolution "of the carbon."

3rd. "When the metal is at a red and white heat, and in a "doughy and liquid state," electric currents are used "as herein-"after described."

4th. Copper is united to tin by putting it into a bath of melted tin "in communication with the decomposing pole of a battery."

When two metals are to be soldered together, a solder is used composed of "yellow copper solder," brass cuttings, and "nickel "in a state of powder," in certain proportions; borate of soda and a quick fire are used, and the electric shocks applied at the precise time when "a small white and blue flame is emitted:" one battery pole is in contact with each piece of metal.

"An ordinary electric multiplier" is used to give the shocks, "having a cog wheel" "and needle or pointer," completing the electric current when it touches the wheel cogs: by this arrangement 300 shocks per second can be given to the metals to be united.

[Printed, 7d. See Mechanics' Magazine, vol. 56, p. 177.]

A.D. 1851, August 14.—Nº 13,718.

SKINNER, Thomas.—1st. Certain means "of producing ornamental surfaces on metal." The metal surface is to be cleansed, preferably "by rubbing with wash leather and powdered lime;" "impressions, taken by preference on tissue paper," are to be placed next to the metal surface, and "rubbed with flannel or "other suitable material;" the paper is then to be washed off; a solution of gum guaiacum in spirits of wine is then coated over

the metal, after which the "impression" may be washed off with turpentine; the metal where the "impression" was previously is thus left clean, and can be etched, or "bitten out with acid." Or the acid may be prevented from acting on the "impression," by dusting over the same "resin, asphaltum, or other suitable "matter in powder;" this is melted by warming the metal, and will resist the acid, thereby producing an ornament or design in relief; the "impression" is then removed "by a suitable solvent," and the ornamented surface may either be left thus, or electro-plated, or electro-gilt; the electro-coating being a part of the process.

2nd. "Ornamenting surfaces of ivory and bone."

[Printed, 3d. See Repertory of Arts, vol. 19 (*enlarged series*), p. 172; London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 354; Mechanics' Magazine, vol. 56, p. 158; and Artizan, vol. 10, p. 66.]

A.D. 1851, September 25.—N° 13,755.

WATT, CHARLES.—1st. Decomposing by electricity "saline or "other substances in solution," by means of a vessel with one or more porous partitions. Examples are given of the decomposition of the chlorides of potassium and sodium, and of "a nitrate "or sulphate of an alkali," by means of the above vessel, fitted with taps, electrodes, "moveable heads for collecting and con-"veying the gases generated," thermometer, gauge containing hydrometer, and a steam jacket. A strong solution of the salt to be decomposed is placed in each of the compartments and the electric circuit completed, the temperature being not less than 120° Fahrenheit; the equality of the specific gravity of the solutions is preserved by adding fresh portions of the salt. Six cells of Daniell's battery are used for this operation; and where the object is to obtain the alkaline base of a salt, a pole of zinc, iron, &c., is used to combine with the "chlorine or acid" set free.

Various operations and methods are detailed.

2nd. "Preparing or obtaining the metals of the alkalies and "alkaline earths, by the action of electricity and heat." An iron vessel, fitted with electrodes, a partition between them, a "moveable "head for the collection of the metals," and "flanges to support "the vessel upon the furnace," "is filled with dry saline matter;" the saline matter is fused, and the current from ten Daniell's cells

passed through it, volatilizing the metal. Chlorides, iodides, and bromines are employed; the bromine and iodine are collected.

3rd. Converting alkaline chlorides into hypochlorites and chlorates. The electric current is transmitted through a solution of the chloride placed in a vessel containing two horizontal electrodes, the negative being above the positive electrode. "A "portion of free alkali" is added to the solution, and if the temperature is kept between 100° and 120° Fahrenheit, a hypochlorite is formed; if the temperature is raised, a chloride and chlorate are formed, of which the chloride is again decomposed, giving a certain additional and proportional amount of chlorate. A bleaching bath may be thus prepared and strengthened.

4th. Separating metals from each other and from impurities by electricity, and by means of vessels with porous partitions. Gold may be thus separated from silver or copper by melting it with any oxidizable metal (if it contains less than three-fourths of alloy), and using it as the positive pole of a single cell Daniell's battery in a solution of nitrate of silver; the alloy is deposited on the negative pole of the battery, the gold becoming detached and remaining in the compartment containing the metal to be purified.

Other similar means are detailed, with other solutions, and for purifying other metals.

It is preferred to employ electrodes prepared as follows:—Lampblack or tar is coked and pulverized, mixed with sugar, and compressed into an iron mould; this is gradually heated until red hot, and the piece of carbon "placed while warm into a strong "solution of sugar, or some of the original tar made hot," "subjected to the action of an air pump whilst still in the fluid," and heated red hot with powdered charcoal or coke in a covered crucible; this being repeated until the required density is attained, when it is finally subjected to most intense heat "for several "days."

[Printed, 8*d*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 301; and Mechanics' Magazine, vol. 56, p. 277.]

A.D. 1851, November 13.—N° 13,808.

BERNARD, Julian.—"Improvements in the manufacture of "leather or dressed skins, and of materials to be used in lieu "thereof, and in the machinery or apparatus to be employed in "such manufacture," consisting of:—

1st. "A system or mode of graining or ornamenting leather or

" dressed skins by pressure." "To obtain an accurate copy of a " well grained piece of morocco, or other embossed figure or " ornamental leather, a good original skin is used as the matrix " of the required figure, and an electrotype plate is made from it " in the usual way of metallic deposition." An ordinary hydrostatic press has "the travelling table of the ram" fitted with a flat steam chest. The electrotype plate is laid upon "the travelling " table;" over that, the skin to be grained; and, on the top of all, a sheet of vulcanized India-rubber. "The table being forced " upwards by pumping," the electrotype plate or die "impresses " its figure on the leather surface."

2nd. Certain "arrangements of mechanism," "or means to be " used for shaving or splitting leather or dressed skins."

3rd. The manufacture of "compound union leather, to be used " as a substitute for ordinary leather."

4th. The manufacture "of a compound fabric of great strength " by joining together two separate woven fabrics."

5th. "An improved mode or modes of diceing or ornamenting " the surface of leather or dressed skins."

[Printed, 1s. 2d. See Mechanics' Magazine, vol. 56, p. 416.]

A.D. 1851, November 27.—N° 13,834.

WHYTOCK, Richard.—"Improvements in applying colors to " yarns or threads, and in weaving or producing fabrics when " colored or party-colored yarns or threads are employed." These relate to:—

1st. "Imparting color to a single thread or pair of threads " intended to form a portion or element either of the warp or the " woof of a figured web."

2nd. "The application of parti-colored yarns, as weft or woof in " the formation of sprigs or other small objects in various fabrics."

3rd. The application of magnetic power to moving small shuttles, whether "parti-colored" or dyed or undyed yarn is used. A shelf forming the shuttle race "is brought up as close to the " warp in front of the reed as possible;" the magnet or magnets are made to pass to and fro on "two stented wires immediately " below the shelf," by means of cords drawn over pulleys, and acted upon by the feet of the weaver putting treadles connected with them in motion. Electro-magnets are to be preferred, having

greater power than permanent magnets, and "admitting of a "temporary suspension of the power when required." The application of this invention to ribbon weaving, or to weaving sprigs on a continuous web, is pointed out.

[Printed, 9d. See Repertory of Arts, vol. 20 (*enlarged series*), p. 84; and Mechanics' Magazine, vol. 56, p. 458.]

A.D. 1851, December 8.—N° 13,845.

BROOMAN, Richard Archibald (*a communication*).—"Certain improved modes of applying electro-chemical action to "manufacturing purposes." "The application of chemical, "electro-chemical, thermal, and galvanic forces, separately or "combined," "applicable to the manufacture and preparation of "organic and inorganic substances."

A galvanic battery is described in which "the same metal marks "the commencement and termination of the series," and "the "central plate" is "one of the poles;" a number of batteries may be united, terminating "in one common central cell." The same principle is applied to conducting wires and "the preservation of "metals from oxidation."

Electro-chemical force is applied to the "fertilization of seeds," by steeping them in "carbonate of potash," then in weak acid; decomposition taking place. "To preserve vegetable materials," they are dipped in weak acid, then "in some basic hydrate," combination taking place, and those that will form antiseptic salts being used in preference. "To preserve animal matter such as "meat," prevent disease in potatoes, deodorize materials, preserve membranous substances, skins, and paper, the same principle is adopted, the antiseptic compound being formed in the substance itself. By the electro-chemical action of combination, the effect of "milling" is produced, and by decomposition "an expansive "effect" occurs. A cleansing or bleaching effect is produced by forming within the fibres certain insoluble salts, and then decomposing them. For purifying syrup or oily matter, acetate of magnesia is used, and the magnesia precipitated afterwards by free carbonic acid. "Saccharine matters" and "fatty hydro-"carbons" are purified by certain insoluble compounds of boracic acid with a metallic base, combining them in the material. Upon similar principles, methods are given for promoting "the conversion "of iron into steel," for preparing hydraulic cements and hardening stones and minerals, for obtaining "basic zinc for painting

" purposes," and for "preparing certain animal fibres, such as " silk for spinning and dyeing."

[Printed, 6d. See Mechanics' Magazine, vol. 56, p. 478.]

A.D. 1852, January 22.—N° 13,906.

TYER, EDWARD.—"Improvements in the means of communi- " cating by electricity, and apparatus connected therewith."

This invention relates to establishing an electrical communication between a station and an approaching or receding train, or *vice versâ*.

The following apparatus are described and shown:—

A station signal instrument for ascertaining the position and distance of an engine or train. This apparatus has an indicator or pointer for the up as well as for the down line, which indicate the words "line clear" or "train," according to whether the line is completely clear for a given distance, or whether a train is approaching or receding within that distance. In an instrument for one line of rails only, the passing of a train over a certain spot completes a battery circuit; a spring armature to an electro-magnet has an upright bar, through which a pin on the pointer axis passes. When the circuit is completed, the pointer is thus caused to move from "line clear" to "train," and a catch retains the armature and pointer in that position until the circuit is again completed through the coil of a second electro-magnet, which releases the catch, thus placing the pointer in its original position.

Methods of completing the circuit by apparatus on the engine, in connection with apparatus fixed to the sleepers of the line. Two parallel metal bars or springs are fixed on insulating blocks between the rails, and are respectively connected with the insulated line wires; the bars are electrically connected by double incline planes at the extremity of spring pistons fixed to the engine, thus allowing the station and engine instruments to be affected. The apparatus may be otherwise modified; springs fixed at one end, resting on insulated blocks, or working on a pin, and having a counterbalance weight, may be fixed between the rails; and "metal " spring brushes" or springs may be fixed to the engine or tender. The circuit of the electro-magnet that releases the catch spring is completed by separate apparatus, consisting of a treadle (depressed by the flange of the engine wheel), which gives motion to a crank shaft and crank, turning a curved spring from a stop pin

into contact with the line wires; or a curved lever may be separated from contact with the side of the rail by the interposition of the flange of the engine wheel, thus causing a spring piston to complete the circuit by depressing a curved spring upon two metal plates.

A "single station instrument" is described and shown, consisting of two horseshoe electro-magnets, each of which can act by a contrary polarity upon the pole of a magnetized and poised needle. When the train approaches the station, the needle, and consequently the pointer, will be deflected from its normal position by one electro-magnet, and retained there by induction until the train leaves the station, when the other electro-magnet will restore it to its original position.

Means of communicating signals to an approaching train. A transmitting apparatus is described and shown for influencing the "engine indicator" by the reversal of the electric current, in which a non-conducting cylinder, suitably inlaid with two differently disposed sets of pieces of metal, reverses the current communicated by them to fixed springs by turning it half round, thus avoiding the use of cross pieces of metal. An arrangement is also described and shown in which the battery is placed where the signal is given; for communicating by this arrangement, a lever at the station draws a wire of the required length into such a position as to reverse the current by acting on the handle of the above-described transmitting instrument.

An "engine indicator." This indicator shows two signs, "stop," and "all right," and is actuated by the transmitting apparatus last described; it may be constructed similarly to the "single station instrument;" or it may have two pointers, each actuated by an electro-magnet and permanent magnet, one pointer being only affected at a time, according to the direction of the current; a catch releases a spring (on the attraction of the permanent magnet), which places one of the hands in an inclined position, and it remains so until restored by the pressure of a spring piston by the receiver of the signal.

A bell apparatus. An electro-magnet, worked by the line circuit, completes a local circuit by a spring armature; the bell is struck by a second electro-magnet in the local circuit, which attracts an armature carrying the bell hammer. The local circuit is completed by a platinum-pointed screw and moveable disc, which prevents the effect of the spark.

[Printed, 2s. 8d. See Mechanics' Magazine, vol. 57, p. 98.]

A.D. 1852, January 29.—N° 13,933.

PULVERMACHER, Isac Lewis.—" Improvements in galvano-" electric, magneto-electric, and electro-magnetic apparatus, and " in the application thereof to lighting, telegraphic, and motive " purposes," consisting of:—

1st. " Capillary batteries," composed of " a tube pressed out of " plastic graphite " (See N° 12,899) " covered with gauze," round which is coiled zinc wire; by a properly shaped cistern, with holes in it, nitric and sulphuric acid is permitted to drop into the graphite tube (filled with pieces of coke), and dilute sulphuric acid drops on to the zinc wire, the waste fluids being conveyed away below; a single fluid may be used. Another battery is described, encased " in glass or porcelain," in which an alkaline fluid falling on an exterior cylinder of coke is used instead of a zinc plate; also a similar arrangement, with flat carbon plates, having (when united) cylindrical channels. Electro-positive or electro-negative gases may be used in this battery.

2nd. Six different improvements in " hydro-electro voltaic chain batteries " (See N° 12,899). First.—" The connecting joints " are made of a non-conductor, or " sometimes I put into the holes of " the spiral " [helical ?] " elements tubes of thin plate which are " set in contact with the positive and negative wires," thus making " a double-jointed chain battery." Second.—" Hygroscopic bat-" teries," which are excited by a deliquescent or oxygen-absorbing substance or salt, placed in flutings in the wood. Third.—In which the links are constructed with three interior grooves for connecting wires. Fourth.—Plates are employed for the links, instead of wood and twisted wire. Fifth.—Copper and zinc " frames," or longitudinal links, are fixed on to " pieces of wood," and modifications. Sixth.—A method of packing a chain battery so that it is insulated in its case, and when wanted is stretched over an insulating frame by means of horn insulating plates, &c.

3rd. " A mechanical interruptor." A clockwork apparatus, in which either unfrequent or frequent closings of the circuit can be obtained; the unfrequent closings are made when a lever moves an excentric connected with one battery pole, so that a spring on a screw wheel completes the electric circuit, whereas the frequent closings of the circuit are made by a " tongue " on a balance wheel fixed on the axis of the endless screw, which works the screw

wheel. The whole instrument forms conducting handles for galvanizing a patient.

4th. "A circuit breaker," set in motion by the pressure of the hand. A weighted spring, in connection with one battery pole, is made to oscillate against a spring only in connection with the other pole so long as it is not struck by the weighted oscillating spring, thus producing a series of closings of the circuit of momentary duration; the whole forms a conducting handle.

5th. "An apparatus for changing the quantity electricity of a "portable galvanic battery" "into intensity, and vice versâ." The elements are arranged in two parallel lines, so that moveable connecting wires can either be used to connect one pair with the pair opposite to it in the other line for intensity, viz., zinc with copper; or for quantity, viz., zinc with zinc and copper with copper. A flat electro-magnetic coil, with vibrating keeper, is also described.

6th. An arrangement for "varying the intensity of the electric "current." The elements are united by means of moveable connecting wires, which, by their elasticity, connect one pair with the next for intensity; but two "toothed plates," moved by a key, enable the elements to be connected for quantity, by each connecting one metal of all the pairs, and at the same time nullifying the intensity arrangement.

[Printed, 1*s.* 3*d.* See Mechanics' Magazine, vol. 57, p. 118.]

A.D. 1852, January 29.—N° 13,938.

HIGHTON, Edward.—"Improvements in electric telegraphs," consisting of:—

1st. Improved keys, in which only one spring is used. The line-wire circuit is closed by a spring and stud underneath the key, and the keys have "spring joints" in two parts, connected respectively with opposite battery poles. On the depression of the key, screw pins or studs break the line-wire circuit and insert the battery. Two keys are used, one to each direction of the current. To facilitate working the telegraph, the letter signalled, when a key is pressed down, is engraved on that key.

2nd. An improved alarum. An arm is made to rest as slightly as possible against the catch of the electro-magnet by means of a spring wound round an excentric; as soon as the arm is liberated the spring has more force, owing to the excentric, and enables the

excentric to raise the clockwork detent. When the arm is about to be stopped, the excentric presses out another arm, meeting the revolving arm, and breaking its momentum before it reaches the catch.

3rd. Another form of alarum, that only acts when the electric current is continued for a certain time. A wheel, carrying the excentric centre on which the hammer lever moves, is kept in continual revolution by wound-up mechanism; on the interposition of a catch by the electro-magnet, some seconds must necessarily elapse before the hammer lever is brought into a sufficiently oblique position to strike the bell on its release. Another plan is described, in which a roller prevents the descent of the hammer lever unless sufficient time has elapsed to allow its excentric centre to come into a suitable position.

4th. Preparing a fabric for receiving and recording the transmission of electric currents, so that different colours may be produced according to the direction of the current, by moistening it with suitable solutions.

5th. Suspending telegraph wires in the air on arms inclined to the posts at an angle of 45°, for securing their insulation.

6th. Employing the power developed by the hydraulic press to stretch suspended telegraph wires.

7th. Stretching telegraph wires. They are placed nearly straight, on temporary supports, by manual labour, and are then brought to the desired degree of tension by causing them to assume a zigzag form.

8th. Insulating and fastening suspended telegraph wires. No sheds or bell coverings are applied, but the wire is varnished and bound with silk for a considerable distance on each side of the point of support; then covered with gutta percha or vulcanized caoutchouc for a few inches, this has placed over it "a tag of zinc "or galvanized iron," and is clamped to the arm by a hook. When a break in the wire is required for a station, a metal link covered with gutta percha is inserted.

9th. "Placing an earth connexion around the arms or supports "about midway between each wire," "so that any electricity that "escapes from one wire" "cannot possibly reach or affect "another wire."

[Printed, 1s. 11d. See Repertory of Arts, vol. 20 (*enlarged series*), p. 205; and Mechanics' Magazine, vol. 57, p. 134.]

A.D. 1852, February 10.—N° 13,963.

ROBERTS, MARTIN JOHN.—This invention is entitled "Im- " provements in galvanic batteries, and in obtaining chemical pro- " ducts therefrom." These improvements consist:—

1st. "In employing tin as a positive plate in a galvanic battery " in conjunction with platinum, or any other conductor of elec- " tricity" which is electro-negative to tin. The exciting fluids are nitric acid, or nitro-muriatic acid, or the nitrate of copper, or the soluble nitrate of any metal electro-negative to tin; nitric acid is, however, preferred, as it yields by the action of the battery "stan- " nic or meta-stannic acid," which is deposited at the bottom of the battery cells, made deep for the purpose; this is combined with soda to form stannate of soda, a valuable article for dyeing textile fabrics. If nitro-muriatic acid be the exciting fluid, chloride or bichloride of tin is formed, "a salt also used in the same " arts." If nitric acid of not less specific gravity than 1·200 be used, a hydrated oxide of tin forms, which falls down as an in- soluble precipitate to the bottom of the cell, and prevents the strength of the exciting fluid from being diminished so much as it otherwise would be.

2nd. "In the employment of copper as a positive metal in " conjunction with platinum or other metal which is electro " negative with respect to copper." Nitric or nitro-muriatic acid is the exciting agent used in this battery. The salts of copper formed are useful in calico printing and for other purposes; "and " some of them may be used to excite a tin or zinc plate in " another battery."

Both the above-described batteries are single-fluid batteries.

[Printed, 3d.]

A.D. 1852, February 23.—N° 13,982.

WALKER, WILLIAM.—"A method or means of ascertaining and " indicating the deviations or errors of the mariner's compass."

In this invention the effects of dip in various magnetic lati- tudes are avoided, and the deviation of the needle due to the presence of iron is indicated.

The compass bowl is made, by preference, of copper, and has on its pivot "a brass bell or cone, which is poised in an inverted " position," whose weight is not "more than one third greater " than that of the card needle and cap," carrying "a fine steel

"rod or axis." "The cap of the needle, which is made of one "sixth of the length of the needle, has at its apex a jewel, on "which the point of the rod" "works, besides which, another "perforated agate is fixed in the lower end of the cap." The axis of the needle and card is made to coincide with its centre of gravity, and the needle is magnetized after adjustment upon "an "inclined pivot." The bell thus, in connection with its steel axis and the long needle cap, acts as a counterpoise, and prevents the effects of dip upon the needle.

To the centre of the glass cover of the compass box is fixed "a "slender hollow pillar, equal in length to the radius of the com- "pass card," which contains a rod inside of it, adjustable at various heights. This rod "carries at top a second or indicator "needle." "A glass dome" resting "on a ring" "attached to "the outside of the compass bowl" encloses the entire apparatus. "When two magnetic needles of different magnitudes" "are "freely suspended in the vertical plane of the magnetic meridian "and at a certain distance apart, both needles, if uninfluenced by "local magnetism, will place themselves parallel to the magnetic "meridian, but with the poles of the lesser needle inverted." When a local disturbing force acts, however, the terrestrial mag- netism exerts its influence over the smaller needle, and if it is adjusted at such a distance from the compass card that its deviation is double that on the compass card, the smaller needle will indi- cate "the deviation of the main needle from its correct magnetic "meridian."

[Printed, 7*d*. See Mechanics' Magazine, vol. 57, p. 161.]

A.D. 1852, March 8.—N° 14,015.

VAN KEMPEN, Peter (*a communication from Gerrit Abraham Cramer*).—"An improved refrigerator, to be used in brewing, "distilling, and other similar useful purposes."

"This invention consists in improvements in apparatus to be "used for refrigerating or cooling brewers' or distillers' worts, "but applicable for other similar purposes, one of the improve- "ments in connection therewith consisting in the employment of "a permanent conductor or circuit through the work, in connec- "tion with the earth, by which means the wort is prevented from "turning sour from the influence of atmospheric electricity "during thunder storms."

The refrigerating apparatus is first described with references to the Drawings.

"The second improvement in refrigerators relates to a means of " preventing atmospheric influences taking effect on the wort when " in the refrigerator. For this purpose a strip of zinc" "is " placed throughout the entire length of the refrigerator so as to " be covered by the fluid therein contained." To one end of the strip of zinc is attached an earth-plate of zinc, and to the other an earth-plate of copper. "Any atmospheric electricity which, " during thunder storms, is liable to turn wort sour, will be " carried off by this arrangement." This improvement is further styled in the Specification "the employment of a galvanic circuit " in the said refrigerator for the carrying off electricity from the " worts."

[Printed, 1s. 8d. See Mechanics' Magazine, vol. 57, p. 239.]

A.D. 1852, March 8.—N° 14,018.

HODGE, Paul Rapsey.—" Certain improvements in the con- " struction of railways and railway carriages, parts of which are " applicable to carriages on common roads," consisting of:—

1st. "The application of an electrical or an electro-galvanic " current being passed through either the up or down rail, and " returned again in the opposite rail, so that a perfect circuit be " kept up through the rails," to prevent the "decomposition of " the iron forming the permanent way," and "the ogidation" [oxidation?] "of the metal forming the rails."

2nd. New arrangements "of movable 'points,' used for crossing " from one line of rail to another."

3rd. In railway carriages, cylindrical springs formed of India-rubber, acting alone or "in combination with the steel spring." Various arrangements are described and shown.

4th. "Three arrangements of a steam spring and lifting apa- " ratus," "to be attached to the axle and boxes of locomotive " carriages, in connection with or without the ordinary spring."

5th. "Various forms of axle boxes for railway carriages."

6th. "The placing of an elastic medium between the wheel " and collars, for the purpose of preventing lateral shocks on " railway carriages."

7th. "Various new forms of metallic wheels" for railway carriages, "either of wrought or cast iron, seperately or combined."

8th. "The application of elastic collars or rings of india rubber "placed between the axle box and the nave of the wheels of "carriages used on common roads, so as to give ease both to "lateral as well as vertical shocks, caused by the unevenness of "the road."

[Printed, 1*s*. 5*d*. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 120; and Mechanics' Magazine, vol. 57, pp. 259 and 462.]

A.D. 1852, March 8.—N° 14,021.

SMITH, William, and SMITH, Archibald.—"Certain "improvements in electric and electro-magnetic telegraph appa- "ratus, and in the machinery for and method of making and "laying down submarine, submerged, and other such lines," consisting of:—

1st. A mode "of insulating circuit wires from the posts." "'Dead eyes' or insulators," and a short length of wire, are interposed between the telegraph wire, just before it enters a post, and at the post insulator—or the ordinary insulator may be used —the circuit being completed by a "copper rod" attached to the telegraph wire, and bent so as to be away from the interposed wire or supports.

2nd. "Arrangements of machinery" for constructing and laying down submarine cables. They are manufactured on board the steam vessel as they are "submerged." As many reels and frames (alluded to below) are fitted in the vessel longitudinally as strands are required; the insulated wire proceeds from the drum on which it is wound through the successive frames, and a central guide plate carrying the various strands, which are (by the motion of the frames and guide plate) wound round the insulated core; the manufactured wire then proceeds over suitable "gripping wheels," is "passed over guide pulleys, and let down through the stern of "the vessel" "into the water." Each reel and frame consists of a "skeleton drum," mounted on "antifriction rollers," revolving with the core and all the wires coming from the machines nearer the core reel than itself; on the same centre, but kept horizontal by a hanging weight, the wire reel frame is mounted (the reel being at right angles to the skeleton drum), the wire from which passes through its trunnion over "an antifriction roller," and through properly placed apertures in the "skeleton drums" of all the machines nearer to the stern than itself; the machinery is moved "simultaneously" by means of pinions on a main longi-

tudinal shaft gearing into wheels on the "skeleton drums." If it is required "to give the wires an independent twist," it can be done by imparting a slow rotary motion to the reel frame on its trunnions from the skeleton drum wheel.

A counting apparatus is described and shown. A number of "pawles," on a crank shaft connected with the paying-out machinery, work into loose ratchet wheels of ten teeth each, affixed to numeral wheels with one tooth each; each "pawle" (except the first) extends over one numeral wheel and the next higher ratchet wheel, thus moving each numeral wheel one tooth or number for every complete revolution of the ratchet wheel below it, and indicating the amount of cable that has been payed out of the vessel.

The insulation of the cable may be tested during manufacture by the following means:—As many insulated "disc wheels" as there are separate telegraph wires are fixed "on an extension of "the shaft" of the drum carrying the insulated wires, and revolve with it; each "disc wheel" has a binding screw to receive one of the wires, in connection with a metallic ring on its circumference, and a spring pressing thereon; a galvanic circuit can thus be completed through the wire.

A modification of the above manufacture is described and shown, in which "four groups of insulated wires" can be combined "with a chain cable as a flexible core" by means of four sets of twisting machinery. The wires (when manufactured) "are "drawn towards a central point by four guide rollers," between which the chain core passes; four wires are served out on to this compound wire, which bind the several parts together.

A "plaiting machine" may be used, or "a hempen core" employed; the machinery is also adapted for making land telegraph wires and "wire and hempen ropes."

[Printed, 1*s*. 7*d*. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 81; and Mechanics' Magazine, vol. 57, p. 238.]

A.D. 1852, April 6.—N° 14,057.

POOLE, Moses.—"Improvements in covering wire for telegraphic purposes," consisting of:—

1st. "Employing flexible varnish on wire before coating it with "insulating materials." The wire is drawn through a trough containing melted bitumen (combined or not with India-rubber or gutta percha), at such a distance from the covering machine that the varnish may set before the insulating covering is applied.

The compound of India-rubber, gutta percha, and bitumen is best applied from a "kneading machine" by means of dies.

2nd. Applying successive coatings of gutta percha and India-rubber. A machine is described and shown, in which the wire is wound off from a drum, passes between fixed studs to straighten it, then through a hollow axis, has a ribbon or fillet of India-rubber wound upon it by the rotation of a bobbin, takes one turn round a wheel connected with the driving machinery, and finally, proceeds to a wheel on which it is wound for use when required. The axis on which the India-rubber bobbin revolves is attached by a joint to the side of a disc revolving on the hollow axis, so that the bobbin may be fixed at the required angle with the wire, a spring bearing against the bobbin to "obtain friction to it," the fillet is thus wound on the wire in a distended state. Motion is communicated from the bobbin-disc pulley to the wheel on which the covered wire is wound by means of a separate shaft working into the wheel shaft by a screw and screw wheel. To each separate coating of India-rubber a separate hollow axis and bobbin is used. A coating of India-rubber solution unites the fillets and the separate coverings.

3rd. Successive coatings of gutta percha, &c., given to wire by dies of increasing sizes, connected with the same or different compartments of the same apparatus. After passing through a guide, the wire passes successively through the dies, gaining greater thickness of covering from each die. "To prevent the joins of the "successive coatings coming opposite each other," the supports of the dies are not placed in a line.

[Printed, 1s. 3d. See Repertory of Arts, vol. 21 (*enlarged series*, p. 101; and Mechanics' Magazine, vol. 57, p. 318.]

A.D. 1852, April 20.—N° 14,077.

GRIFFITHS, Robert.—"Apparatus for improving and restoring "human hair."

The Specification and Drawings describe and show various methods of transmitting electric currents through the skin and hair, by means of combs and brushes constructed for the purpose, the battery being contained in the combs and brushes, or they may be in connection with a separate battery.

A comb is described and shown, of which "the teeth are alter-"nately of copper and zinc, or other metals suitable for com-

"posing a galvanic battery, and they are connected together by "being run on a wire *a*, there being a metal washer between each "neighbouring pair of teeth." Into the back of this comb, a wire, wound with worsted dipped into a solution of common salt or very dilute acid, is inserted when it is used.

A brush is also described and shown, in which the battery (woollen cloth saturated with solution of common salt, copper, and zinc) is placed at the back, and is connected with the very fine metallic wire forming the "teeth of the brush" by two plates. Another arrangement is described and shown, in which the "teeth" consist partly of bristles, and partly of very fine wires.

A "Memorandum of Alteration" was enrolled by the Patentee, February 17, 1855, in which the following alterations are made:—

In reciting the date of the Letters Patent in the Specification, it was stated to be of October 20, in error for April 20.

Also, the first paragraph of the description of the parts of the comb shown in the Drawings, (quoted in the above abridgment,) is altered to,—"the teeth are alternately of copper and zinc, or "other metals suitable for composing a galvanic battery, and they "are connected together by being run on a wire *a*, coated with "insulating material, there being a metal washer coated with "insulating material between each neighbouring pair of teeth, "the teeth being separated by a washer of felt."

[Printed, 7*d*. See Repertory of Arts, vol. 21 (*enlarged series*), p. 104; and Mechanics' Magazine, vol. 57, p. 354.]

A.D. 1852, April 20.—N° 14,080.

RIDGWAY, John.—This invention consists of "the application "of the art of 'electrotype' or 'electro-metallurgy' to the orna- "menting or decorating of articles of glass, china, earthenware, "and other ceramic manufactures," so that "the surface of the "non-conducting body is so prepared that the metal deposited "thereon shall become alloyed or combined therewith."

To effect this object, "a new glaze or coating substance" of a porous character is applied to the surface of the articles, so as to give them "an affinity for copper as a first coating," by submitting them "to strong alcohol, or a gelatinous solution, or a "thin coating of mastic varnish," or a varnish of asphalt and mastic "fused and dissolved in spirits of turpentine;" immersing

them, when the above coating is nearly dry, in a solution of "phosphorus reduced by bisulphuret of carbon;" immersing them in "nitrate of silver;" setting them aside to dry; making their surfaces conductable by brushing them over with highly pulverized carburet of iron and sulphate of copper intermixed, until a high polish is attained; corroding the articles "by means "of the fumes of hydrofluoric acid;" and electro-coating them with copper by an acid solution of its sulphate to which sulphate of zinc has been added. The articles are then removed from the depositing vat, cleansed, dried, and polished; any grease is also removed by boiling in a solution of pearlash or "American "potash."

The surface of the copper is then prepared, by immersion in a solution of nitrate of mercury, for electro-silvering or electro-gilding. Other metals besides gold or silver may be electro-deposited to ornament the surface prepared as above described.

[Printed, 4d. See Mechanics' Magazine, vol. 57, p. 374.]

A.D. 1852, May 29.—N° 14,146.

BAIN, ALEXANDER.—"Improvements in electric telegraphs and "electric clocks and timekeepers, and in apparatus connected "therewith," consisting of:—

1st. A method of keeping "in view for a time" "mechanical "signs" whilst other signs are being produced. A train of wheelwork, through bevil gearing, gives motion to an endless band with a fringe of bristles passing round two drums, and having in front of it an indicating plate. Another train of wheelwork is called into action only when a detent is released by an electro-magnet; this gives motion to an excentric which keeps the pointed end of the indicating plate drawn in during the passage of the current, thus obliging the fringe to pass in front of the plate; the portion of the fringe so passing constitutes the signals by means of a suitable code.

2nd. A means of obtaining "successive signs without changing "the direction of" the electric current. An axis carrying a "disc" is constantly kept rotating by means of clockwork, and a "screen," having the centre of its arc of motion on the keeper of an electro-magnet, is only moved by the disc when an electric current passes, after which springs bring back the screen. Two signs are thus obtained.

3rd. An improvement in electric clocks, "whereby the clock-" "work" "employed to give motion to a magnet is constantly" "controlled and regulated by a second system of clockwork." A magneto-electric machine gives motion to any number of clocks, and consists of six fixed electro-magnets, over the poles of which a double permanent horseshoe magnet (having its "similar" "poles upwards and downwards") revolves by means of clockwork. The fan of the clockwork is released at intervals of one minute by a stop-wheel and lever moved by a good regulating clock; the magnets, moving round in less than one minute, are stopped at each revolution by a detent falling into a notched disc, and again set in motion, at the expiration of one minute, by the stop-wheel acting on the lever and detent, the axis of the lever being fixed on the boss of the detent.

[Printed, 2*s.* 3*d.* See Repertory of Arts, vol. 21 (*enlarged series*), p. 187; and Mechanics' Magazine, vol. 57, p. 476.]

A.D. 1852, June 12.—N° 14,166.

REID, WILLIAM, and BRETT, THOMAS WATKINS BENJAMIN.—This invention "relates to the preservation and protection from" "injury of the wires used for transmitting electricity for electro-" "telegraphic purposes," and consists :—

1st. In enclosing the insulated wires "in pipes of wrought or" "cast iron, wood, slate, or earthenware;" "the principal charac-" "teristic of such pipes being that they are composed of a trough-" "like portion or body, and a cap or cover which fits upon the" "same," and does not "necessarily require any fastening" or bolting. Pipes of various shapes, with various ways of fitting on the covers, are described and shown; various kinds of socket joints,—variously shaped curved pipes, for altering the direction of the wires, and for use at stations,—a "joint box," where the wires are united, fastened with iron keys,—and a "testing box" with a hinged lid, let flush into the roadway or pavement, are described.

2nd. In enclosing "those portions of the wires which are in-" "tended to traverse a river or other body of water" in "a ver-" "tebral chain, consisting of a series of short hollow portions of" "iron, united together in a manner somewhat similar to that of" "the several portions of the vertebra or back bone, and so as to" "leave a free passage throughout for the reception of the insu-

" lated wire or wires, while at the same time the whole is flexible, " and the several portions are capable of turning freely." "Each " of the links is cast in two halves," with holes therein, "to " receive pins or rivets, whereby the two parts are connected " together when the two halves of the neck" "of the next link " have been inserted in the hollows or recesses" "of such first " named halves."

[Printed, 1*s*. 6*d*. See Repertory of Arts, vol. 21 (*enlarged series*), p. 36; and Mechanics' Magazine, vol. 57, p. 516.]

A.D. 1852, June 24.—N° 14,185.

BELL, Thomas.—" Improvements in the manufacture of sul- " phuric acid," consisting of:—

1st. " Applying currents of electricity in sulphuric acid cham- " bers or apparatus, for the purpose of promoting the union of " oxygen and sulphurous acid gas, thereby producing sulphuric " acid, and effecting a saving of nitre or nitric acid now used." " Electric currents, obtained by means of jets of steam," are, by preference, employed, but "other sources of electricity may be " resorted to." Streams of electricity from Armstrong's hydro-electric machine are used, either "in place of or in addition to " the use of nitre or nitric acid as heretofore employed." The " collector" or conductor, " having numerous small metal points," is placed opposite to the steam jets, and consists of an iron rod or tube; to the end of this collector is affixed "a bar or rod of lead " or other suitable metal," which passes through a glass pipe conveying the sulphurous acid into the chamber. If nitre or nitric acid is used in conjunction with electricity, it will be reduced in quantity "in proportion to the employment of currents of " electricity;" in this case, the end of the bar or rod conveying the electricity is introduced, through a separate closed glass pipe, into the sulphuric acid chamber. As steam is required within the sulphuric acid chamber, a portion of the jets from the hydro-electric machine may be used for that purpose.

2nd. " Obtaining and applying continuous streams of ozone to " act on sulphurous acid in the manufacture of sulphuric acid."

[Printed, 4*d*. See Repertory of Arts, vol. 21 (*enlarged series*), p. 52; and Mechanics' Magazine, vol. 58, p. 18.]

A.D. 1852, June 24.—N° 14,190.

ALLAN, THOMAS.—"Improvements in producing and applying "electricity and in apparatus employed therein," consisting of:—

1st. "Producing induced electric currents by means of electro-"magnets." "Several straight pieces of soft iron" are each coiled with a primary and secondary wire, and placed end to end, "so as to form an electro-magnetic circle." The primary coils are connected together so as to form a continuous circuit when connected with a battery, and the secondary coils are similarly connected together for use in electric telegraphs, &c.

2nd. "Producing induced electric currents by means of perma-"nent magnets." The permanent horseshoe magnets are fixed on a wooden surface, so that their poles are in the circumference of a circle, the line joining the poles of each magnet being in the same plane as the surface on which they are mounted; through the centre of the circle formed by their poles an iron spindle passes, carrying radiating soft iron arms, each surrounded by its coil. The spindle can carry, if necessary, several sets of arms, each opposite its own set of permanent magnets. A to-and-fro current is generated by the rotation of the spindle, but it can be converted into currents in the same direction by means of the pole changer mentioned in N° 13,352 (which see), or any other suitable pole changer.

3rd. An electro-magnetic engine, in which a succession of impulses is given to a rod by the attraction of keepers one after the other, for electro-magnets placed on stages at suitable and increasing distances apart, and magnetized one after the other; the keepers are not fixed to the bar, but rest upon collars, and slide up as they come into contact with the magnets.

4th. A pole changer. Insulated metallic arms, each in connection with one pole of the battery, have a third arm with a metal end to complete the line circuit; and work on a centre against two springs on each side, connected with the line-wire circuit.

[Printed, 11*d*. See Mechanics' Magazine, vol. 57, p. 390, and vol. 58, pp. 82 and 37.]

A.D. 1852, July 6.—N° 14,197.

SHEPARD, EDWARD CLARENCE (*a communication*).—"Im-"provements in electro-magnetic apparatus suitable for the pro-

"duction of motive power, of heat, and of light," consisting of:—

1st. A machine, in which the permanent magnets are fixed and the helices move. The Specification and Drawings describe and show a machine in which parallel and equi-distant vertical wooden frames support horseshoe permanent magnets on their faces, each frame supporting two sets of magnets; the poles of the magnets are fixed in the circumference of a circle, so as to include between them the helices suitably fixed on the circumferences of wooden or brass wheels, mounted on a common axis, and rotating between each pair of frames. Opposite poles of the magnets must be next to each other in the circumference of the circle in which they are placed, also in the adjoining frames, so that every helix may have a north pole at one end of it, and a south pole at the other. Instead of being fixed on the face of the frames, the permanent magnets may have one pole on each side of the frame, the magnets on one face of the frame may then either be alternately of opposite poles, or all one polarity, they being so arranged (with respect to adjoining frames), nevertheless, that the helices may have a north pole at one end and a south pole at the other.

A "commutator" or "pole changer" is described, in which all the coil wires are brought to four insulated metal rings on the helix wheels; wires passing through similar rings on all the wheels are brought to a large commutator of four rings on the main shaft, which has suitable rotating inlaid pieces and fixed springs for enabling the machine to give a continuous electric current in one direction.

2nd. A machine in which the permanent magnets move and the helices are fixed, having all the necessary alterations made in its construction, but otherwise similar to the first machine.

In both these machines "straight magnets" may be used instead of horseshoe magnets, provided their poles be placed as above directed.

[Printed, 1s. 10d.]

A.D. 1852, July 6.—N° 14,198.

ROBERTS, MARTIN JOHN.—"Improvements in the production "of electric currents in obtaining light, motion, and chemical "products and effects by the agency of electricity, part or parts "of which improvements are also applicable to the manufac-

"ture of certain acids, and to the reduction of ores," con-
"sisting of:—

A mode of obtaining cheap electric currents by restoring the spent materials of the battery to their original state, and using them over and over again. In a battery of "platina," iron, and nitric acid, the nitrous fumes are mixed with the requisite quantity of oxygen to convert them into nitric acid, and brought into contact with a large surface of water, which effects a chemical union and absorption of the gases; the nitrate or pernitrate of iron formed has the nitric acid "distilled into a receiver containing "water," and the oxide of iron left is converted "into metallic "iron by smelting it with carbon in the usual way:" when sulphuric acid is used in this battery, the resulting sulphate of iron has its acid "driven off into a receiver in the ordinary way." These improvements are also applicable to the reduction of ores; examples are given in the reduction of copper ore by nitric and sulphuric acids respectively.

An apparatus to form nitric acid from nitrous acid gas, consisting of two cisterns, one above the other, between which a number of bent glass tubes (containing flints) are fixed, dipping into the water, and forming a continuous wet channel for the nitrous acid gas; air is blown into them by a bellows, which unites with the nitrous acid gas, forming nitric acid, a solution of which is effected by the water on the surface of the flints, which may be passed repeatedly through the tubes if a strong acid is required; the air and gas (free from acid fumes) passes into the outward atmosphere after it has passed through a sufficient length of tubing.

The use of a second electric circuit, to keep the strength of a galvanic battery constant, when a lead positive plate is used. Wires from the poles of the main battery are connected with "pla-"tina" plates immersed in "dilute acid;" by adjusting the distance between them the resistance is made sufficiently great to prevent the passage of the current when the main battery is acting.

Improvements in electric illumination. Three electric lamps are described and shown, in which "the points of the electrodes" are "from time to time brought into contact with each other, and "then removed to a proper or striking distance apart;" two methods of accomplishing this by an electro-magnet in the electric circuit, and one method by clockwork, are described and shown. The electro-magnet (during the passage of the electric current)

keeps the electrodes a proper distance apart by a keeper acting through levers and clips, or the electro-magnet acts directly on the electrode holder; on the magnetism ceasing, by the wasting of the electrodes, they are brought into contact, again drawn apart, and so on. The clockwork acts periodically by means of a cam wheel, levers and clips, in a similar manner: this is serviceable for lighthouses. Two more sets of electrodes, worked by one or more batteries, may be used, they being so arranged that when one set is at its maximum power, the other set is at its minimum.

A mode of obtaining electric light by passing electricity through a thin piece of graphite enclosed in an exhausted glass globe.

A mode of increasing the brilliancy of the electric light by means of lime or other alkaline earth, interposed between the electrodes in a similar manner as in the "Drummond light," or mixed with the material of the electrodes.

Two apparatus, described and shown, for diminishing the spark which occurs on breaking an electric circuit. One in which, before breaking the primary or working circuit, the electricity is made to flow in a shorter circuit by means of a spring attached to the keeper of an electro-magnet in the primary circuit. Another, in which the primary circuit is never broken, but magnetizes a magnet, which completes a shorter circuit, through which the current prefers to pass. Clockwork, attached to a cam wheel and levers, may be made to effect the above objects.

A magneto-electric machine, consisting of a ring composed of permanent magnets, separated by a non-magnetic metal revolving through helices of insulated wire, being supported by friction rollers, and thus producing currents of electricity in the helices.

A mode of obtaining electro-motion, in which a wheel (on whose periphery are fixed "small electro-magnets") rotates so that the electro-magnets pass close to the poles of a fixed magnet; these small electro-magnets being made neutral or feebly repulsive of the large magnet when they come opposite to its pole.

The use of wheels similar to "Barlow's rotating wheel," to produce motion. Several of these wheels are mounted upon the same axis, each working in separate mercury troughs; motion is given to the axis by the transmission of electricity successively through each wheel from the centre to the periphery, or *vice versâ*.

The use of lead positive plates in a battery with any negative plate, and with a mixture of dilute nitric and sulphuric acids.

The use of tin positive plates in a battery with any negative plate, and with a caustic alkaline solution.

In a thermo-electric battery, applying heat to the plates by means of "currents of dry air, or any fluid which is not a good "conductor of electricity;" or the plates may be protected, "where "the heat is applied, by any non-conducting body."

In electro-chemical decomposition "a U tube," or a vessel divided by a partition, which partition has an aperture below the surface of the liquid, is used when the eliminated products are not to be mixed. When any gas evolved from a pole is not to be mixed with the solution, put a pipe, open at each end, over the pole, "and in the decomposition of bodies take chloride of sodium and "re-convert it into other substance." When liberated chlorine, or other matter is to be maintained in contact with the solution, the pole must be sunk deeply in the solution, and the passage for the evolved gas made as long and tortuous as possible.

The purification of sugar, by passing galvanic currents through its solution to cause the impurities "to be separable by filtration."

[Printed, 1s. 7d. See Mechanics' Magazine, vol. 58, pp. 41 and 56.]

A.D. 1852, July 15.—Nº 14,222.

GAUNTLETT, Henry John.—"Improvements in organs, "seraphines, and other similar wind instruments, and also im- "provements in pianofortes;" consisting of:—

1st. Applying electro-magnetism to open the pallets or valves of finger and pedal organs. Under each valve (to which an armature is fixed) an electro-magnet is placed, the circuit of the coil of which is completed by the depression of the corresponding key by means of a metal bar placed under all the keys, thus the note required is produced; on the removal of the finger a spring closes the valve. By this arrangement no "rollers, backfalls, squares, "&c." are required, "the deep fall of the key, and the heavy "pressure therefrom," are also avoided.

A similar arrangement is employed for drawing and shutting off the stops, "but that a sufficient length of motion to the slider "may be obtained," the armature is mounted "on the short limb "of a crank lever," the circuit may be completed by means of a key, and "it will be convenient to have a duplicate arrangement "of electro-magnets and armatures," to return the sliders as well as to draw them.

The full organ is brought under the command of one set of keys by having as many batteries and metal bars as there are organs, and by each key carrying the same number of metal pins, each communicating with its own set of electro-magnets by insulated conductors. The pedal board may be fitted with a like arrangement.

"To allow of the gradual opening of the shutters of the swell "box," they are hung independently of each other, and have electro-magnets instead of levers; studs near the key-slips complete the circuit through as many electro-magnets as required, and open one or more shutters at pleasure.

2nd. Employing electro-magnetic force to open the valves or pallets of self-acting or barrel organs, &c., and striking "the hammers "of pianofortes (without the intervention of keys)." The notation brings the magnet of the valve or hammer within the electric circuit by means of springs. In the pianoforte the hammer is thrown by the intervention of an armature lever, hopper, and lifting rod between the electro-magnet and its hammer.

In this invention any kind of electricity may be used.

[Printed, 1s. 3d. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 169; and Mechanics' Magazine, vol. 58, p. 97.]

A.D. 1852, August 12.—N° 14,257.

WEARE, Robert.—"Improvements in galvanic batteries."

[No Specification enrolled.]

A.D. 1852, August 23.—N° 14,274.

ROBERTS, Julius.—"Improvements in the mariner's compass," to show the deviation of the needle due to the presence of iron.

The needle of an ordinary compass has attached to its northern limb, near the axis, an upright bar carrying a magnet, balanced and free to revolve on an axis immediately and vertically over that of the needle. The balanced magnet revolves on an axis at its extremity, and has its north pole over the needle's south pole. The compass needle has also a small bar magnet fixed vertically on to a standard near its "south end," so as to be adjustable at various distances from the needle, and consequently from the balanced magnet. This magnet opposes similar poles to the balanced magnet and needle. By adjusting the distance of the balanced magnet from the compass needle or vertical magnet, a "pointer" at the northern extremity of the balanced magnet may be made to "give the true north point" (in this case the effect of

a mass of iron on the magnet and needle are alike, but in opposite directions); or the deviation of the magnet and needle may be made exactly equal, in which case the line bisecting the angle between the pointer and the north end of the needle is "the true "meridian."

A magnet, or a piece of soft iron, is placed on the centre of the glass cover to the compass box, which tends "to lift the centre of "the compass off its bearing point," so as "to prevent the effect "of dip."

[Printed, 5d. See Repertory of Arts, vol. 21 (*enlarged series*), p. 221; and Mechanics' Magazine, vol. 58, p. 214.]

A.D. 1852, August 26.—N° 14,280.

CROSSE, Andrew.—"Improvements in the extraction of metals "from their ores," consisting of :—

"A mode of applying currents of electricity for separating copper "from ores containing that metal, and consequently the other metals "contained in such ores from the copper." The ore is "calcined," "reduced to powder," and placed at the bottom of a suitable vessel containing dilute acid. A platinum frame of "wire-work" is let down on to the ore, and connected with the "positive pole" of a galvanic battery; "a basin of wood," lined inside with sheet copper (which lining has "a cover of copper-wire netting"), is connected by its lining with the negative pole of the battery, and lowered into the dilute acid. By the action of the battery "the "copper will be received into the basin in the form of a powder," and "the other metals separated from the copper will be in the "sediment at the bottom of the vessel." "A quantity of the "subsided matters in the vessel may, before being run off from "the bottom of the vessel, be tested to ascertain whether it is "desirable to carry on the process further thereon; the dilute "acid, run off from the subsided matters may be used again. "I have found it desirable to heat the liquid during the process "as much as conveniently may be done, even up to boiling, and "this I have done, when using earthenware vessels, by means of a "sand bath." The ores should be stirred in the liquid before subjecting them to the electric currents. Sulphuric acid is preferably used in the vessel containing the copper ore; and twenty pairs of "Daniel's battery" are suitable to supply the electric current.

[Printed, 6d. See Repertory of Arts, vol. 21 (*enlarged series*), p. 235; and Mechanics' Magazine, vol. 58, p. 216.]

A.D. 1852, September 23.—N° 14,300.

MATHIEU, François (*partly a communication*).—" Improve-" ments in apparatus for containing, aerating, refrigerating, " filtering, and drawing off liquids, and in ornamenting such " apparatus," relating to:—

1st. Refrigerating " beverages of all kinds whether aerated or " not."

2nd. "Certain novel arrangements for producing aerated " beverages."

3rd. " A mode of protecting the external surfaces of vessels " containing aerated beverages, by the application of the electro-" galvanic process." Metal is " deposited on the sides of the " glass," to any thickness, " by means of a galvanic battery, after " the manner adopted in electro-typing." " Any pattern of " ornamental design " can be obtained, for, " by first coating the " vase with gutta percha, gelatine, plaster of paris, or black lead, " &c., according to the design required to be produced, and then " immersing it in the solution, and subjecting it to the action of " the galvanic battery, the metallic deposit will fall only on those " portions so coated."

4th. " Certain improvements in the construction of stopcocks, " whereby they may be made self-acting, if required."

5th. " An improved construction of portable filters."

[Printed, 1s. 9d. See Mechanics' Magazine, vol. 58, p. 297; and Artizan, vol. 10, p. 254.]

A.D. 1852, October 21. —N° 14,330.

JACKSON, Edward Henry.—"Improvements in producing " artificial light, and also in producing motive power," relating to:—

1st. Electric illumination. Fluctuations of the electric current are prevented from interfering with the light by means of an adjustable notched "roller" and "stop" working into a notched plate on the electrode holder, that enables the electrodes to be approached to each other, by self-acting apparatus, as they are consumed, but prevents them being drawn apart; the notched plate, "roller," and "stop" working together as rack, ratchet wheel, and click. The self-acting apparatus consists of a fixed hollow electro-magnet, into which another electro-magnet on

the electrode holder works; a "spiral" [helical?] spring serves to conduct the current from one electro-magnet to the other, at the same time keeping the interior magnet above the larger, and the electrodes in contact when no current is passing. When the electric current passes, the electrodes are drawn apart by the motion of one electro-magnet into the other. A "non-consuming "electrode" is described, consisting of a piece of carbon, with a recess in it, in which "platina" or mercury is placed.

2nd. "A governor meter or electric current indicator," consisting of "a glass globe with two hollow ends, forming two arms," open at the top, in which dilute sulphuric is placed, and having a fixed conductor at one end, and a screw conductor at the other; these being included in the circuit, regulate the current according to the distance through the liquid they oblige the current to traverse. A "needle" is attached to this apparatus to indicate the quantity of electricity passing.

3rd. "An improved battery," consisting of a number of cells in a line placed in the divisions of a wooden trough containing a cistern and draw-off apparatus. Each cell consists of two small gutta percha troughs ("perforated at bottom"), supported in the box; a porous cell or bag of "Burnet's patent woven hose," between the gutta percha troughs, made water-tight by a piece of wood at the end; a copper-plate; and an unamalgamated zinc plate. The fluid for the outer cells proceeds from a cistern above the battery to the battery cistern, which it fills until the cells are filled by means of a groove round the top of the box communicating with all the cells. At the same time the woven porous cells are filled from a third cistern (containing "a mixture of salts" with sulphuric acid) by means of tubing and a cock. The battery is discharged by means of an insulated rod acting on cocks communicating with each cell; the cocks are thus turned all at once. The porous cells are emptied at the same time by unscrewing a "stopper rod" from an outlet in the wooden bottom, which "stopper rod" projects above the top of the porous cell. Over the exit cocks to the outer liquid is an air-tight covering of gutta percha, with a tube proceeding to a lower cistern. The cocks each consist of a tube (with a passage leading to the battery), having a cylindrical plug and helical spring at one end, and a ball (suspended by a wire from the plug) at the other end; on the pressure of the plug (by a piece of iron on the rod) the ball permits the exit of the

fluid. The rod is fitted with a ratchet wheel and click, so that it may keep the cocks open.

"A glass conveyor" is described and shown, in which a metal plug, free to turn on a piece of glass, may be turned into contact with two pieces of metal in connection with the battery poles, or be left out of contact with the metallic surfaces. A glass "force " pump for supplying solution" is also shown in the Drawings.

[Printed, 1s. 2d.]

A.D. 1852, October 21.—N° 14,331.

BRIGHT, EDWARD BRAILSFORD, and BRIGHT, CHARLES TILSTON.—"Improvements in making telegraphic communica- " tions, and in instruments and apparatus employed therein and " connected therewith," consisting of:—

1st. "A dead beat right and left motion needle telegraph." Two permanent bar magnets are free to vibrate upon parallel horizontal axes, with similar poles uppermost; between these poles an electro-magnetic coil with iron centre is placed, its axis being also horizontal, but perpendicular to the magnet axes. When no current passes through the coil, the magnets remain in contact with its core; as they are attracted by the polarity, they induce upon it, and according to the direction of the current (voltaic or magneto-electric), one or other of the magnets is repulsed from the core. Small arms project from the magnets or their axes towards each other at right angles to the magnets, "so as to embrace" a " centre piece" (or flat piece of metal fixed against the pointer axis). The pointer axis is between the magnet axes, and parallel to them; it is deflected by the arms according to the magnet deflected. When the apparatus is at rest, the centre piece is locked between the arms. An auxiliary coil (without iron) may be used or not between the lower poles of the permanent magnet to assist the action of the upper coil by its attraction. In another arrangement, a "horseshoe electro-magnetic coil" is used, whose arms are in the same straight line as the permanent magnets, and are entered respectively by their poles.

The "galvanic sending apparatus" consists of "a metallic " handle or cylinder" connected to one battery pole, which deflects a spring, connected to the line-wire circuit, against the other battery pole. For this purpose the cylinder has metallic cheeks, which take the "sending instrument" out of the circuit, "at the moment

"of sending," by deflecting one spring from a stop in that circuit; it has also a piece of ivory which deflects the other spring against the other battery pole, thus including the battery in the line-wire circuit.

2nd. Improvements in hanging and insulating suspended line wires. First.—A wooden arm projecting from the suspension post is covered wholly or partially with marine glue, and has at the end a clench for the wire screwed up with a bolt; or "the post itself "may be coated with marine glue and the wires fastened thereto;" or a metal clamp, coated with gutta percha, may be used in connection with the arm; in this case, a "filling piece," holding the clamp, is glued into the post with marine glue. Second.—A sharp edge or ridge, "upon which moisture will not remain," is interposed between the wire and the post or ground, the wire not resting on the edge. Third.—The wires are suspended on arms of different lengths, so that they may not be in the same vertical plane. Fourth.—Each alternate post has its supports for the wires near each other and far apart, so as to make the wires alternately to converge and diverge. Fifth.—In "shackling the wires" where a break is required, two earthenware rings are attached to a square connecting frame; these rings have hooks to hold the ends of the wires, and "insulating channels" or sheds, one above and the other below the hook.

3rd. Insulating subterranean wires. The wires are laid in longitudinal grooves in lengths of wood, each wire having its own groove, and the upper and under lengths being united with marine glue or other suitable cement. When wires are protected by a helically-wound riband of iron, a flexible washer is interposed between the overlap and the turn preceding it.

4th. Insulating submarine wires. The wires are protected by a considerable amount of insulating medium between them, and helically-wound as described in the 3rd improvement.

5th. A "re-transmitting instrument" for receiving signals from either direction, and forwarding similar signals derived from a local source of electricity, towards their destination; thus relays of currents may be employed to transmit signals with certainty on a long telegraphic line of one wire by self-acting means. The instrument consists of a pair of coils fixed between two pair of oscillating magnets, as explained under the 1st head, and connected with four voltaic series by means of stops; the magnets

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have their axes connected with the line wires and earth-plates respectively. On an electric current passing through one of the line wires in a given direction, it deflects one or other of the magnets (of the coil not acting on the permanent magnet whose axis receives the current) against a stop; thus completing the circuit of one of the relay batteries through the further length of line wire, and transmitting a similar signal to that received by the instrument. By the addition of suitable connections, and using four fixed insulated mercury cups and an insulated moveable dipper to each permanent magnet, this apparatus may be worked by one battery.

6th. Bringing telegraphic apparatus into circuit at an intermediate point from a distant station. The apparatus, "as fitted " to the instrument to be operated on," consists of :—A pair of coils fixed between two pair of magnets of an indicator instrument according to the 1st improvement; a double coil placed above these, which repels both of its magnets on the current being passed through it; a local galvanic battery; and a coil and magnet as in the 1st improvement, which releases the detent of a clockwork " make and break" apparatus. The last apparatus is called a " decircuitor," and is always included in the local circuit. The passage of the line-wire current through the double coils deflects magnets against stops, and brings the indicator coils and decircuitor into the circuit of the local battery. When the indicator instrument is in the line-wire circuit the decircuitor is brought into play by a particular simultaneous deflection of the magnets. This plan is applicable to working switches from a distance, and can be employed to put separate telegraph instruments, working on separate sets of wires, out of circuit.

7th. Ascertaining the place of a fault in the long conducting wires. A series of resistance coils are mounted in a box, containing also a galvanometer. To ascertain the distance of an earth or other contact from a station, a galvanic battery has its current divided into two circuits, one through the resistance coils, the other through the faulty line wire; when galvanometers, placed respectively in these circuits, are made to indicate similar deflections, by including more or less coils in the circuit, the amount of wire in the included coils will enable the distance of the fault to be determined.

8th. A standard galvanometer giving an invariable result. A

coil, free to vibrate upon an axis, is used instead of a magnetic needle; the force of a current is measured by the deflection of this coil from a fixed coil surrounding it, both coils being included in the circuit.

9th. Protecting telegraph wires and apparatus from the action of lightning. In the first arrangement, an exhausted air-tight glass box has let into it at opposite sides "metallic terminals," respectively connected to the line-wire circuit and to the earth; the exhaustion is carried to that degree that a given voltaic intensity (greater than is requisite for working the telegraph) will make direct connection between the line-wire circuit and the earth. In the second arrangement, a metallic disc with points, connected with the line-wire circuit, is placed at a short distance from another similar metallic disc, in connection with the earth, by means of a "screw regulator." In the third arrangement, thin, knotted, silk-covered wires are included in the line-wire circuit; the knots are opposite to metallic points in connection with the earth, and are fused on the passage of the lightning, thus passing it to the earth; two metal brushes (one in the line-wire circuit, the other connected with the earth) are used in addition to the thin knotted wire.

10th. A magneto-electric machine for telegraphs generally. In this arrangement, for every movement of the handle lever or key, including return to original position, only one current of magneto-electricity is passed from the machine, so that either the positive or negative current may be used separately. The machine consists of two electro-magnetic coils free to vibrate before the poles of permanent magnets; the current is only sent along the line wire when it is in the required direction by means of two spring clicks, actuated by the handle lever, working into two click wheels in the coil and line-wire circuit, the click wheels being suitably fitted with portions of the teeth that are non-conducting for that purpose; when the current is not in the direction required, the metal part of the click wheels complete a short circuit between the terminations of the coil; the current is sent along the line wire when the click passes over the non-conducting part of the teeth, and its direction is determined by the click and click wheel put into action (*i.e.* by the direction of deflection of the handle lever). In working this machine, the current communicating signals to a distant station does not influence the local indicating apparatus. When a pair of keys are used there is a set of induction coils to each key, and the

connection between the coils and the line-wire circuit is cut off, except when the clicks (worked by the keys) are on conducting portions of the click wheels.

11th. A "type-printing" telegraph. The type is stationary, and is fixed to the dial plate in a solid circular frame, in the centre of which a cylindrical tube is free to revolve, having bearings in the dial plate and in a bracket attached to it; this cylinder carries the paper roller and hammer, and has independent motion given to a wheel fixed to it by an arrangement of the 1st improvement; when the cylinder is brought to the proper position, a second electro-magnet depresses a rod freely passing through the centre of the paper roller, which strikes the paper to the type by a hammer, and rotates the paper cylinder by a catch entering a click wheel; a spring restores the rod to its place. Secondary batteries may "actuate printing apparatus," magneto-electricity being the primary force.

12th. Causing mercury to effect metallic contact by compressing it in a closed vessel by means of air, &c., the points with which it is desired to make contact being within the vessel.

13th. A centrifugal alarum. The weights of a governor or regulator of a clockwork train are made to act as clappers.

14th. Winding coils for telegraphic purposes. The core is divided lengthways into compartments by means of non-conducting separating pieces, and each compartment is filled before another is begun, beginning at one end compartment, and progressing regularly to the other end.

[Printed, 2*s*. 2*d*.]

A.D. 1852, October 21.—N° 14,332.

REID, William.—"Improvements in electric telegraphs."

[No Specification enrolled.]

A.D. 1852, November 11.—N° 14,343.

LIDDELL, Charles (*a communication*).—"Improvements in electric telegraphs," relating to:—

"An improved mode of constructing and applying apparatus "or instruments commonly called 'insulators,' for the purpose "of obtaining more perfect insulation of telegraph wires "when suspended in the air."

A painted upright or support of wrought-iron piping has a wooden

plug fitting tightly into its top, into which a wrought-iron bar or bolt is firmly fixed. The bolt projects from the pipe sufficiently to allow a hood of cast iron to be placed upon it. The hood is pointed at the top, and formed of a hollow cylinder joined on to a larger curved hollow base (where it forms a recess); two lugs spring from the base "so arranged as to secure the main wire" "in its proper " position, and prevent any tendency to draw the wire, being laid " in a circular recess between the lugs." The inside of the hood and the top of the bolt are coated "with enamel or other insulating " material," and fastened together with "lead or other metal, or " cement run in" between them.

A wooden post, with hoods attached to separate sustaining bars fixed on it for several wires, is described and shown: "the sustain- " ing bar might be made with branches, and the insulators attached " thereto in any required number, and the same plan might be " adopted where the supporting post is of iron piping."

[Printed, 6*d*.]

A.D. 1852, November 13.—N° 14,346.

PETRIE, William.—" Improvements in obtaining and applying " electric currents and in the apparatus employed therein, part or " parts of which improvements are applicable to the refining " certain metals, and the production of metallic solutions and of " certain acids," consisting of:—

1st. " Solution cells." For use in making battery solutions, cleansing carbon plates for elements or electrodes, &c. A diaphragm shuts off the passage of the fluid by the lip, except it comes from the bottom of the cell, having first passed through the material in the body of the cell; thus the liquid comes away from the lip charged with material, cleansed, or otherwise operated upon as desired, the lip being a little above the surface of the material. These solution cells may be arranged in series, so that each may drop fluid into the one below it; or compound cells, having partitions under or over which the fluid may alternately pass, may be used. When it is beneficial to keep in the heat generated by the process, the cells may be surrounded with any suitable non-conducting substance.

2nd. Obtaining a saline solution for galvanic apparatus, &c., by means of the " solution cells." Water is first impregnated with potash or other alkaline base by passing a part of it through

a solution cell; it is then caused to drop slowly through a series of shallow solution cells filled partially with "offal from shambles, "chopped fine," or other "decomposable nitrogenous matter "placed amongst finely divided solid matter." If desired, nitric acid may be obtained from this salt "by the well-known pro- "cesses."

Sulphuric acid may be obtained by the solution cell process, by using sand and sulphurous acid solution.

3rd. Making such solutions as "acidulated muriate of am- "monia," sulphate of copper, or nitrate of silver, by using deep solution cells, and transmitting the liquid through them as fast as it may be needed for use; in the two first cases acidulated water is passed through the cells; but in the third case, nitric acid, and the material used is "the granulated alloy of gold and silver used "by refiners of gold."

4th. Working a series of cells on the "differential system." This plan is used when the matter employed is partially or entirely soluble, and it consists in adding at intervals a cell charged with fresh material to the lower end of the series, and removing the uppermost cell. For this purpose the cells rest in "cradles" placed upon rails in a frame of wood; the cradles are fixed with a pin, and forced up from time to time with a crowbar or other suitable power. Examples are given of the formation of nitrate of silver from nitric acid and an alloy of gold and silver by this means, and of other salts from the gold alloy, &c.

5th. Washing "the gold resulting from the aforesaid process," "by placing the cells in a new series," "and working the gold "upwards" "by a similarly differential process, using water to "pass down through the series."

6th. A "hand syphon" for use "in any of the various pro- "cesses of this invention," in which the following points are observable. The ends of its legs are bent at right angles to its plane, and form an angle of about 60° with the legs, so as to retain its charge while being adjusted. A handle projects from its top, so that it can be held without wetting the hand whilst charging it. An "air chamber" is fixed at its highest point. It has a downward curve at the extreme ends of the legs, to draw off liquid as low as possible.

7th. The employment of a syphon having a long but small bent ascending and descending tube communicating with an air-

tight barrel and descending tube, so as to fill the syphon with liquid by atmospheric pressure when the legs of the syphon are trapped with fluid, and the barrel is filled with water and made air-tight.

8th. A galvanic battery. Instead of cells, spouted shallow troughs are used; in each trough several porous veseels, containing suitable acid and amalgamated zinc, rest by their spouts. The horizontal negative plate may be of the same metal as that precipitated from the solution by the galvanic action (cemented to the bottom of the trough or not), or it may be a roughened plate of plumbagoed glass. The troughs and porous vessels are so arranged as to discharge into one another, as described in relation to the solution cells. The porous vessels are varnished inside and out with wax where the electric current does not pass. Diaphragms are placed, where necessary, before the spouts, to oblige the heavier portions of liquid to discharge. The elements, for example, used in this form of battery may be a plumbagoed glass plate (covered with silver during the galvanic action), nitrate of silver solution (See the 4th head), dilute sulphuric acid, and amalgamated zinc.

9th. The employment of elastic tube tightly fitting a smooth hole in the side of the battery, to conduct liquid from one vessel or partition to another, also to impede the conduction of electricity of low tension.

10th. The agitation and aeration of the battery solution, in cases where the precipitating solution is weak, or contains elements which are restored from the decomposing action of the battery when aerated. A disc of the precipitating metal may be rotated in the solution, and small glass tubes drawn nearly to a point are connected to a supply of air.

11th. Precipitating the silver, copper, &c., obtained in solution by refining gold and silver by electro-deposition. The nitric acid from the lowest trough (See 8th head) is used, instead of fresh acid, to dissolve more alloy; when charged with base metals, it is passed through "a spare battery;" the metallic deposit thus obtained is dissolved in a portion of the above impure solution, and the silver precipitated by metallic copper. This cupreous solution is, by passing through another battery, resolved into copper and acid solution.

12th. A carbon battery, in which the carbon is in the porous vessel. An annular cover, inside the porous vessel, receives and

transmits the gases to "a gas collector" (See 18th head); and conveys fresh liquid from cell to cell, as in the "solution cell." The carbon element is connected to the zinc by a circular band tightened by a screw, which also enters a nut on the strap for the zinc. An elastic tube (See 9th head) fits into a hole in the bottom of the outer cell, and is connected with an inelastic tube, to enable the liquid to overflow into the next cell below, either in a level or a gradient battery series. The outer cells are "catotenic," *i.e.* have their lower ends extending deeper than the zinc and porous cell, a diaphragm supporting them.

13th. "Syphono-conduit arrangements" for supplying and emptying batteries. "For such liquids as become heavier as they "become exhausted," a "vulcanized caoutchouc" tube is carried to the bottom of the cell (preferred to be "catotenic"), and has its "other end dipping down outside and turned up and fixed "through the bottom of a moveable vessel." A number of tubes may be fixed in the same vessel. The battery may be charged or emptied at will by raising or lowering the vessel.

14th. A trough double-fluid battery with cross partitions. The upper part of the sides are so inclined inwards as to permit a channel to be made on each side, one communicating with the cell of the negative metal, the other with the cell of the positive metal. This battery is discharged simply by inclining the cells from side to side, at the same time elevating the trough at one end.

For medical purposes an "electrode pad" is used, consisting of spongio-piline sewn to a platinum plate, and covered with perforated gutta percha; the whole is used wet.

15th. Batteries with tubular communications between the cells. The pipes or channels are made, by preference, at the upper part of the cells, and are inclined and bored through so as to be cleaned, corks being inserted when the battery is in use. Surface channels are used for liquids that become lighter by the working of the battery.

16th. Magneto-electric machines. An insulated coil of wire has a core of soft iron (to which it may be fixed or not), with branches at each end opposite to the permanent magnetic poles; the electric current (a to-and-fro one) is generated by the revolution of the core only, or core and coil, round its axis; thus continually changing the polarity of its branches. In another machine, wire is wound in coils round a brass rod mounted in bearings, and

having soft iron armatures sunk into longitudinal grooves; the coils are separated by rings, of which the iron forms a part, and which bring the iron within the influence of permanent magnets; on the rotation of the bar, the iron is variously polarized, and a to-and-fro current generated in the coils.

17th. The construction and use of a "draught cell" for effecting changes in gaseous or liquid matter passed through it. Pipes shaped like socketed drain pipes rest on a covered dish and have inlets for gases at various heights; at the top is placed a vessel with a highly porous bottom, containing water or other liquid, which percolates down through the sand or other materials in the pipe as the gas is drawn through it by suction from the upper end; or the water may be flushed intermittently from a vessel with two compartments rocking to and fro on a pivot. The materials in the cell are solid or porous, in proportion as they are to expose a considerable surface to the gas or to exercise a combining action. The particles are of a particular and uniform size. The under part of the loose matter is supported upon a cone of the larger particles of the loose matter itself. Draught cells, through which different gases rise, may, for some purposes, be used in combination.

18th. A "collector," to collect the gases for the draught cell. A pipe is formed with a number of water-lute cells on its upper surface, whose covers communicate with the source of the gas.

19th. The employment of draught cells worked on the "*dif-*" *ferential system*," for oxygenating nitrous gas from batteries, &c., and for refining gold and silver. The differential system is that by which the liquid meets the gas in the contrary direction and is increasingly charged therewith; the stronger liquid meeting the stronger gas, and the weaker gas coming into contact with the weaker liquid.

20th. The employment of draught cells to convert sulphurous gases into sulphuric acid with or without the use of nitric acid.

Many details and examples are given in this lengthy Specification.

[Printed, 1*s*. 4*d*.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N° 17.

NEWTON, CHARLES HENRY, and FULLER, GEORGE LEEDHAM.—" Improvements in protecting electric telegraph wires."

"This invention consists of using troughs of wood, slate, or " other suitable material for receiving one or more wires, and " using covers fitted into or over such troughs; the covers being " fixed, when desired, by hoops and wedges, or by other conve" nient means."

[Printed, 4½d.]

A.D: 1852, October 1.—N° 28.

POOLE, MOSES (*a communication "from America on behalf of " Mr. Goodyear, the inventor"*).—The title of this invention is, " Improvements in coating metal and other substances with a " material not hitherto used for such purposes;" and the invention consists of "insulating wire for electric telegraphs," "coat" ing insulating bell-formed or other shaped insulating sheds " for telegraph wires," and other articles that will bear a high degree of heat, with a compound of India-rubber and sulphur.

In the case of tubes, rods, or wires, a thin sheet or fillet of India-rubber mixed with sulphur is wound round the exterior surface of the article with a slight overlap; or the material may be forced through dies when in a plastic state. For covering wire, "the compound " may contain a large proportion of pitch or coal tar, deprived of water."

" When applied for coating telegraph insulators, "the material " may be applied both inside and out, or only on one side, by " pressing thin sheets of the material on to the parts desired " to be covered."

When the surface is covered with the material, it is subjected gradually to a high degree of heat, and kept at that temperature

for some hours. Less heat is required for telegraph wires, as they should be flexible. "Where wire or other articles are liable to "adhere by coming in contact in the heating process, they should "be kept apart by powdered talc or soap-stone."

Matters giving off like products of sulphur by heat may be used instead of sulphur, and various coloring and other matters may be added to the material.

[Printed, 2½d.]

A.D. 1852, October 1.—N° 39.

ABATE, Felix, and DE CLERVILLE, John Julius Cléro. —"Improvements in preparing, ornamenting, and printing on "surfaces of metal, and other substances," consisting in:—

"Dyeing and printing on surfaces of metal, wood, glass, and "other substances."

Using "engravings made of elastic plates," composed of a mixture of glue and sugar. A fatty or resinous ink is used as "a "resist," which is transferred to the article from the sunk parts of the plates by pressure and heat; the article is then washed with any of the dyeing colors or solutions that are used for printing on textile fabrics; when dry the resist is cleaned off. This process is used for printing on metallic surfaces, they being only thoroughly cleansed; after the application of the resist the article is washed "with a solution of any of those salts which produce, "*through an electro-chemical spontaneous action*, an adhesive "precipitate of certain metallic oxides upon other metals, or any "other chemical change on the surface of the metals with which "they are put in contact."

Articles may be partially or ornamentally electro-plated by means of "*the electro-plating bath*," after having the resist printed upon it.

Other applications of the above processes are set forth; also other processes, not relating to the application of electric force, for scouring and ornamenting metallic surfaces.

[Printed, 8½d.]

A.D. 1852, October 1.—N° 55.

MUMBY, George.—(*Provisional Protection only.*) "Improve"ments in the manufacture of envelopes, and the machinery, "apparatus, or means to be employed therein."

This invention consists of envelope machinery in which "elec-" tricity, magnetism, or electro-magnetism" is used to feed the blanks. "The electricity used in the feeding process is generated " or excited by the usual apparatus, consisting of a cylinder, " rubber, and conductor; the cylinder is made to revolve by a " band attached to the pulley on the main shaft. The electric " fluid is conveyed to the feeder by means of a chain fastened to " the conductor, and at the opposite end is a piece of India-rubber, " which by its elasticity is used to break the electrical current, " thereby causing the blank to be placed in its proper position. " After the blank is taken up by the electric feeder, it is carried to " the folding apparatus by means of a bell-crank lever working " loose on the main shaft, to the long arm of which is connected " the traversing frame, on which is the feeder, and the short arm " has a connecting rod to the crosshead; the latter as it ascends " raises the short arm of the lever, and consequently brings the " feeder over the folding box, previous to the gumming and em- " bossing action; these latter processes being accomplished by " cams on the main shaft actuating suitable machinery."

Various other mechanical details of envelope machinery, having no connection with the electrical action above referred to, are set forth in the Provisional Specification.

[Printed, 2½*d*.]

A.D. 1852, October 1.—N° 100.

POTTS, William.—" Improvements in sepulchral monuments," consisting in "the combining electrotype deposits of copper with " marble or stone, either natural or artificial, or wood, polished, " stained, or painted, to form a background, framing, basis, or " support to the metal subject."

To represent an object in relief, a wax "model" is made, electro-coated with metal to form a "matrix," and into the matrix a "repetition of the model is deposited," which "is chased up and " finished by the usual processes, and forms the core from which " to take a flexible mould. This flexible mould is composed of " glue and wax or other suitable material, or a piece mould " of plaster may be taken from it; a deposit being made into " these moulds as above described forms the metal object for the " monument. The core forms the basis for repeating the pro-

" duction." "A groundwork or back, together with a support " for the metal," is next prepared, "according to the character of " the monument, of marble, stone, or wood," and the electrotype subject fixed thereon or thereto.

"When the monument is designed to stand alone without any " background," a full figure or subject is produced, "perfect on " all sides, by the electrotype process," then a pillar or pedestal is constructed of marble, stone, or wood.

The above-described process may be reversed, and the figure or subject made of wood, stone, &c., "fitted to a back ground-work " or support of metal, produced according to any required design " by the electrotype process."

[Printed, 2½*d.*]

A.D. 1852, October 2.—N° 162.

FUCHS, John Ignatius.—The title of this invention is, "An " electro-magnetic apparatus;" and the invention "has for its " object arranging an electro-magnetic apparatus for alarums " and other like uses, wherein the apparatus, so long as a battery " is in operation and in connection with the wires composing the " circuit, will constantly by its own action, make & break the " circuit, and by a hammer or other instrument act on a bell or " other surface.

" The invention consists of producing repeated oscillations by " means of a lever so arranged as to break the electric current " when acted upon by an electro-magnet, and to complete it " again when the action of the electro-magnet has been stopped, " so as to cause the action again to take place; and for arranging " apparatus in connection therewith for giving alarm or notice at " a distance, when two surfaces previously in contact have been " separated, such as the opening of a door or window."

An electro-magnetic apparatus is described and shown, in which an armature lever of an electro-magnet has a reaction spring and contact piece in connection with one arm, and a hammer lever in connection with the other. When the opening of a door or window removes the pressure from springs in the electric circuit, and thus excites the electro-magnet by completing the circuit, the contact piece breaks connection at the same time as the armature is attracted, the bell is rung, the reaction spring draws the lever back,

and the oscillating motion and ringing of the bell thus produced is continued as long as the circuit is complete or as the door or window is left open.

[Printed, 5½d.]

A.D. 1852, October 2.—N° 191.

STRINGFELLOW, JOHN.—This invention is entitled "Im-"provements in galvanic batteries for medical and other pur-"poses;" and it consists of a battery formed of small compound bars or plates permanently connected, and at intervals hinged, so as to fold into a pocket case.

The exciting acid is carried in contact with the plates by means of fibrous or bibulous substance, or by the capillary attraction of the metals themselves, or by a combination of both these methods.

The compound bars are formed by winding lengths of flattened copper wire round amalgamated zinc strips "in a spiral" [helical?] "direction, an insulating substance having been placed between "the two metals."

To combine these compound bars (or galvanic pairs) in an intensity series, the end of the flattened wire is soldered to the zinc of the next pair; or the bars may have similar metals soldered together so as to form a quantity series. In either case they form a flat compound arrangement called a "leaf;" these leaves are hinged at suitable intervals, and, with the bibulous paper between, can be folded like the leaves of a book.

A flexible metallic band, made by plaiting fine wire with silk, and having snaps fastening into tubes on the last leaves of the battery (like necklace fastenings), is used to connect the battery with the human body.

[Printed, 6½d.]

A.D. 1852, October 4.—N° 212.

SLATER, THOMAS, and WATSON, JOSEPH JOHN WILLIAM. —"Improvements in the application of electricity to illuminating "purposes," consisting of:—

1st. "Improvements in apparatus for employing electricity as "an illuminating agent." When the electric current passes, the upper electrode is gripped by the eyes of brass levers attached to armatures of an electro-magnet in the circuit; but when the current ceases, the upper electrode is allowed to descend into contact

with the lower electrode and renew the light. In this case the electro-magnet is secured to a bracket fixed to the pillar of the upper electrode.

In another lamp, the following points are observable:—The induced magnet is in the base of the lamp, its armature being connected by levers with the upper electrode rod; the lever in immediate connection with the electrode rod carries a reaction spring, and has a fork embracing a hinged collar that grasps the electrode rod when the current passes, but lets it drop when the electro-magnet is inactive; the striking distance of the electrodes is adjusted by raising or depressing the fulcrum of the forked lever, thus altering the distance of the armature from the electro-magnet; this is accomplished by a screwed boss (by which the lever fulcrum is supported) turning on the upper portion of the pillar; the lower electrode is raised by means of the toothed lever armature of a second electro-magnet, working a screw on the lower electrode shaft by a fixed wheel; or a long rack may be used in connection with a toothed lever working vertically. Several electrodes may be used with this arrangement.

The lower electrode may be raised by hand by means of a screw secured to a pulley, the electrode being mounted in a traversing nut, into which the screw works.

2nd. "Electrical governors, indicators, and alarums," &c. In an electric governor (to indicate variation in the current) the current excites an electro-magnet, thereby drawing down an armature (between which and the electro-magnet a helical spring is interposed), and revolving an indicator by a rack and pinion movement.

An alarum indicates the weakening of an electric current by an electro-magnet in connection with it releasing the detent of an axle having a tendency to revolve; in its revolution an arm on the axle strikes the hammer lever.

To adjust or check the amount of current, it is passed through iron wires of different diameters imbedded in pipe clay, a moveable lever making the requisite connections.

To provide for the power of a battery diminishing, a reserve battery has its power transferred to the light apparatus, when required, by an arrangement of metal plates in a wooden disc, over which a pivoted arm connected to the light apparatus moves; the plates being suitably connected to the respective batteries.

The poles of the electrodes may be changed by a "brake," consisting of a slide with metallic ends (connected respectively to the electrodes) moving over metallic plates suitably connected to the battery.

3rd. Causing "an equable consumption of the electrodes," by using "two or more electrodes in the same or different planes," and "so as to produce more than one point of illumination in the " lamp at the same time."

4th. Improvements in "the nature and manufacture of the " electrodes." The electrodes are made of a mixture of purified pulverized coke, beech charcoal, gas pitch, and Newcastle baking coal; heat is applied to the mass, at first gradually, for some hours. An electrode of the required size is steeped in caustic lime, exposed to a white heat, placed in alum solution, again brought to a white heat, plunged whilst hot into treacle, and again ignited; in electrodes for powerful lights, soluble glass is used instead of alum. By adding the non-conducting substances, excessive "convection" is avoided.

5th. "The application of electricity to the purposes of sig-" nalizing." Electro-magnets for this purpose, and for use in electric lamps, are made by inserting, between strips of an insulated band of which the coil is made, plates of soft iron; for this purpose portions of the band are bent back.

[Printed, 11½d.]

A.D. 1852, October 6.—N° 277.

DUNDONALD, Thomas, Earl of.—"Improvements in coating " and insulating wire;" consisting "in various particulars whereby " ordinary concrete bituminous substances are rendered applicable " to guide and transmit the galvanic or electric fluid through sub-" terranean excavations, as effectually as the well-proved bitumen " of Trinidad or that of the British North American provinces" (See N° 13,698, Old Law).

A mixture of shellac and rosin (by pounding and sifting) has added to it, "as a solvent," "viscid oil of petroleum or of distilled " tar;" the whole is subjected "to gentle heat in a vessel sur-" rounded by steam or hot water, stirring the mixture to produce " solution, amalgamation, and permanent plasticity." This " adhesive compound" is combined with bitumen, separately

" heated; caoutchouc is added in case of deficient tenacity or " flexibility."

In coating the wire, it is heated by a gas flame or other contrivance before passing into the coating cylinder, "in order that " the circumjacent material" " may be melted, and form a closely " adhesive covering." "To insure insulation and protection " an " external pipe may be derived from the same box or case, or from " another, into which filamentous, metallic, or other substances " may be introduced." "Grooved or plain rollers may also be " employed to coat wire singly or in groups, guided (on their " entrance between sheets of bitumous coating) by pins or holes, " so that they shall be deposited in parallel equidistant lines. " These sheets may be combined with textile or fibrous sub- " stances."

The vegetable gums and rosins being combined with antiseptic oils and mineral substances, render " the insulating coating " secure from decomposition by heat, damp, or destruction by insects."

[Printed, 5½*d.*]

A.D. 1852, October 9.—N° 316.

BURQ, Antoine.—(*Provisional Protection only.*) This invention is entitled " Certain instruments, apparatus, and articles for the " application of electro-galvanic and magnetic action for medical " purposes;" and "consists in certain instruments and apparatus" made of " copper and brass and English and German steel com- " bined," and applied to the human frame for the purpose of giving to it "magnetic, electric, or magneto-electro action."

The following shapes and modifications of this invention are shown :—Conjoined rings; a series of " medals" "hung together " by chains;" bracelets; a corset busk; " whipping rods made of " a bundle of the four metals;" "an Indian strygil for causing " friction," having "small wooden wheels" "alternately covered " with copper, brass, English and German steel;" " metallic " wadding," "made of cotton wadding, moistened with some " glutinous matter, such as treacle, on which a coating of filings " of the four above-named metals is sprinkled, over which a thin " layer of cotton is again placed;" "armatures or large rings for " the thigh, leg, or arm;" and " a peculiar bath in which filings of

"the said four metals are to be used in a wet or dry state. For the "prevention of oxidation or other ill effects," "the outer face or "faces of these instruments" may be coated "with tin, silver, "or silver gilt."

[Printed, 4½d.]

A.D. 1852, October 9.—N° 323.

ROUSSEAU, Jean Jemot.—(*Provisional Protection only.*) "Improvements in inlaying and ornamenting metal plates to be "used for door plates, sign plates, and other purposes to which "such inlaid or ornamental plates may be applicable."

"This invention consists in producing ornamented plates by "means of the electrotype process." "In order to make a door "plate, for instance, with glass or metal letters inlaid in copper or "other metal," the letters are fixed "with their faces downwards "on a plate," and metal is electro-deposited "all round them to "a suitable thickness, after which the face plate may be removed, "and the letters or ornaments will appear imbedded in the de-"posited metal." "Ivory, porcelain, mother of pearl, or other "substances, may be inlaid in the same manner, and any orna-"ment or device may be produced by assembling or combining a "number of pieces, of different forms or materials, on a face "plate, so as to form a pattern," and then depositing metal round them.

The letters for the above process may be cast or otherwise formed "of any elaborate pattern or device," by means of suitable moulds or dies.

It is also proposed "to fill up by metallic deposition letters or "designs engraved in plates in the ordinary manner, in place of "the black or red wax or other composition usually employed "for that purpose."

[Printed, 2½d.]

A.D. 1852, October 12.—N° 342.

MICHEL, François Alexandre Victor.—(*Provisional Protection only.*) The title of this invention is, "Stereotyping in copper by the galvanoplasty."

The process consists of applying "the galvanoplasty to "reproduce in copper any engravings in relievo in general;

" either that they be on wood standing, or on plate, on copper, " or every other metal; either that" the "process be executed upon any stereotypes of bitumens or of material for " printing," which is required to be "reproduced again in galvano- " plasty."

The "process is executed, 1st, in working the model in copper " on one of the aforesaid objects; 2ly, with gutta-percha; 3ly, " with wax; 4ly, with all materials fit to retain a stamp; 5ly, at " last, in reproducing with these various models the objects em- " ployed to be stamped."

" Engravings in general which are employed in the typography" may thus be reproduced by "the galvanoplasty."

[Printed, 2½d.]

A.D. 1852, October 13.—N° 377.

ROBERTS, Martyn John. — "Improvements in galvanic " batteries, and in obtaining chemical products therefrom," consisting of:—

1st. "Employing antimony as the positive plate in a galvanic " pair or series in combination with platinum or some other sub- " stance electro negative thereto as the negative plate; this pair " is excited to action by nitric or other acid." The chemical product from such a pair, when excited by nitric acid, is oxide of antimony.

2nd. "The employment of bismuth as the positive plate in a " galvanic pair or series in combination with platinum or some " other substance electro negative thereto as the negative plate;" this pair is excited "to action by nitric or other acid." When excited by nitric acid, oxide of bismuth is obtained as a product.

[Printed, 2½d.]

A.D. 1852, October 20.—N° 459.

HARRISON, Charles Weightman, and HARRISON, Joseph John.—"Improvements in protecting insulated tele- " graphic wires," consisting of:—

1st. "A new composition or varnish" to "coat and protect " the gutta percha or other insulator in which electric telegraph

"wires are insulated." This composition is made by dissolving shreds of caoutchouc in bituminous naphtha, to which solution creosote is added; this mixture is placed with a certain amount of shellac into an iron vessel over a slow fire, and the mass "stirred "until it becomes thoroughly amalgamated."

2nd. "Protecting telegraph wires, after the same have been "insulated, by a varnish or other thin coating, by winding "spirally" [helically?] "round the same strips of caoutchouc in "combination with an outer coating" of the varnish alluded to under the 1st head. The strips of caoutchouc are wound so that they slightly overlap each other; over these strips the coating is applied so as to unite them. It is preferred to draw a leaden tube over these protected wires, as set forth in N° 13,660 (Old Law) (which see).

3rd. "Protecting insulated telegraph wires for submarine pur-"poses by galvanized iron strips, ribbons, or plates, the cross "section of which is somewhat the shape of an inverted cone, and "which when united form a tubular line." "Several strips, "ribbons, or plates of galvanized iron" are wound "spirally" [helically?] round one or several insulated wires (protected or not). Each strip "forms separately the segment of a circle, and the "whole, when united, form a complete and uninterstitial line." The protective covering preferred is "strips or ribbons of flannel "or horsehair cord saturated with the composition herein-before "described."

[Printed, 5½d.]

A.D. 1852, October 21.—N° 473.

BERNARD, Julian.—"Improvements in the production of "ornamental surfaces upon leather."

This invention "relates to an improved system or mode of "making large dies for graining or ornamenting leather," such ornamentation being effected according to Letters Patent N° 13,808 (Old Law) (which see).

In this former invention a die is formed "to give a fac-simile of "the exact surface of an original skin of morocco leather by taking "a cast of such skin by the electrotype process." "In carrying "out this invention it is found to be an object of importance to "obtain dies of a larger size than one original skin," and the present invention, relates to the method pursued to obtain the

required large dies. For this purpose, "two or more portions of "a skin are laid down and firmly secured to any convenient flat "surface, such as polished slate. The junction edges of each "separate portion of the skin are then depressed by a suitable "tool so as to press those portions of the skin below the surface "of the grain of the leather from which the die is to be made. "The skin is now ready for the preparation of the die, and when "the electrotype process is used the deposit of the copper in the "depressions or grooves will of course be thicker, and will stand "up or be raised slightly above the surface of the rest of the plate. "This extra thickness enables an engraver to cut away or engrave "those portions of the die to correspond with the graining of the "leather so as to present an uniform appearance of the grain over "the whole surface of the die. It is obvious that by adopting "this process enlarged dies of any kind may be produced with "perfectly regular surfaces, although the surface of the pattern "from which such dies are taken may be irregular."

[Printed, 2½d.]

A.D. 1852, October 21.—N° 481.

FOWLER, John, junior.—"Improvements in laying wires for "electric telegraphs."

"This invention consists of attaching properly insulated wire "to a plough or cutter having a moulding end suitably arranged "for making a hole at any desired depth in the ground; and "thus, as the cutter progresses, the prepared wire is drawn into "the hole formed at the lower end of the cutter; and in cases "where the wire is desired to be protected by tubes, the tubes are "also drawn into the earth in like manner with the wire, and "similarly to that in which tubes have been before drawn into the "earth for draining."

The plough described and shown has wheels or rollers supported so as "to accommodate themselves to the irregularities of the "surface of the soil," the frame carrying them being "supported "by a pin" for that purpose. The two hind wheels or rollers swing upon a chain attached to the frame, so that the plough can be kept in a vertical position or steered in any required direction by locking the wheels either to the right or left by means of a pole. Attached to the coulter is a foot, broadest near the front end, "so "that it may pass through the land with less friction on the back

" part," having a slot "with a dovetail end to receive the dovetail " edge of the end of the coulter," and made fast to the coulter by a wedge. The telegraph wire from a reel is shown attached to the foot of the coulter by means of a chain. A horse-power plough is shown, but a steam plough, easily arranged for laying telegraph wire, is described in the Specification of Letters Patent, N° 480, of the year 1852 (New Law).

[Printed, 6½d.]

A.D. 1852, October 23.—N° 497.

LEGRAS, Louis Napoleon, and GILPIN, William Lawrence.—(*Provisional Protection only.*) " Improvements in the " generation of electricity :—

" These improvements are effected by using a battery, partly " magnetic and partly voltaic; that is, consisting of a cylinder or " other suitable piece of iron, or compounds of iron or metal, " used with a solution composed of any common salts and water " or other suitable liquid."

[Printed, 2½d.]

A.D. 1852, October 23.—N° 501.

LEGRAS, Louis Napoleon, and GILPIN, William Lawrence.—(*Provisional Protection only.*) " Improvements in treat- " ing flax, hemp, and other fibrous substances."

" This invention has reference to the separation of the filamen- " tary substances from the wood in the plant by means of the " action of electricity brought to bear thereon; also the separa- " tion of the filaments of cotton, silk, and all fibrous plants and " materials by the means aforesaid; and the filaments of the said " fibrous materials being treated according to this invention may " be rendered strong, and of good color and quality."

Thus "the plant or substance to be treated" is placed "in a " solution such as that referred to in the process under" the " invention of 'Improvements in the generation of electricity'" [See N° 497 (1852)]. The plants or substances are then passed " under or through rollers," or submitted " to pressure in any " other suitable manner, whereby the filamentary substances can " be separated from the other parts."

[Printed, 2½d.]

A.D. 1852, October 25.—N° 511.

HUNTER, JOHN.—(*Provisional Protection only.*) "Improve-"ments in electric telegraphs, and in apparatus connected there-"with."

The following improvements are described in the Specification, and shown in the Drawings.

A distribution of the circuit wires in a "district telegraph." A complete circuit is made by the wires from each battery pole through all the stations, "returning to point of departure." Thus "double or manifold circuits" are formed, "widely diverged in "their course, but at certain stations brought into close proxi-"mity or contact." A separate alarum circuit, connected with the same battery, and on similar principles, is also shown.

Constructing post insulators. An iron standard, connected to the post, carries a porcelain or glass cone, on which is supported a cast-iron cap and cup. The wire lays in a "porcelain rest," enclosed by a "catch" at the top of the cast-iron cap. Underneath the cap is a "pierced clay cup." A "bracket form of insu-"lator" is also shown, with an "insulating ring."

A "signal closet," containing a "circuit wheel," a crank with weighted handle, and "hand key" [a spring apparently in the Drawing] for transmitting signals to a "signal register," (See below); an "electro-magnet and armature for receipt of communi-"cations from a central station;" and a "lightning escape," composed of strips of brass, the central one serrated and connected with the earth.

The "signal register," consists of a grooved roller resting on "agate stylets" immediately over the centres of "a U shaped rod "drawn up into" electro-magnetic coils.

A "signal call," consists of "vertical coils," an "armature," "break piece," "hammer," and "copper disc or other alarum."

A "transmitting apparatus." A keyboard with oblique springs is placed over a revolving cylinder, differently graduated over each key. By this arrangement the strokes of an alarum are able to be timed "numerically and simultaneously on any number of public "or other bells or alarums."

An apparatus for striking a large bell. Wound-up clockwork in connection with a heavy hammer is liberated by the action of an electro-magnet on its armature. The armature lever acts upon

" a falling arm," and by means of levers and a cam releases a detent; a pin on the cam axis is " arrested at the end of one revo- " lution," and the bell hammer is " ready to repeat the stroke."

"An hydro-pneumatic alarum apparatus actuated by electric " agency." In one part of the apparatus the movement of an armature lever admits the air (from a compressed air reservoir) to a whistle of "resonant material;" and in another part a large bell hammer is released by electro-magnetism; the hammer being connected with the piston rod of an air cylinder.

An "apparatus for registering alarums" (See "transmitting " apparatus"). Pointers of units, tens, and hundreds are each " impelled by armature of electro-magnet carrying a ratchet."

" An ordinary once-striking clock" is applied to test the integrity of circuits. A cylinder, with pins "spirally" [helically?] arranged, deflects a "testing key" or spring, periodically by its revolution, at the same time a bell is struck by an armature lever of an electro-magnet if the circuit is unbroken.

The following improvements are alluded to, but not further described or shown:—

"The application of a new composition for insulating wires " throughout their entire length."

" Improvements in the transmission by telegraph of fac-similes " by a new means of preparing the copy."

" Applying fusible or combustible conductors to render electric " telegraphs self-communicating in cases of fire."

"The combination and arrangement of a signal wheel with two " elastic" [electric?] " circuits, so that when one is broken the " wheel may revolve and actuate a key in the circuit."

[Printed, 5½d.]

A.D. 1852, October 25.—N° 516.

WALL, Arthur.—(*Provisional Protection only.*) " Improve- " ments in the manufacture of sulphuric and other acids," consisting of " the application of currents of electricity, whether " produced from a hydro-electric, voltaic, thermal, or other " battery, to the manufacture of sulphuric acid and the pro- " duction of nitric acid."

" A series of shocks from an hydro-electric or other battery " answering the purpose" is applied " to the sulphureous" [sulphurous?] " acid gas as it evolves from the burner, and which

"is made to escape through a passage erected for the purpose "between the burner and the chamber;" or voltaic currents are applied "in the burning of sulphur.

"The mode of applying the hydro-electric battery is to place the "rubbers or that part of the machine in the interior of the passage "on one side, and the points on the other side of the passage "which the sulphureous acid gas traverses to the chamber." Points are also placed "in the large receiving or gas chambers "where shocks may pass through the gas. These shocks produce "nitric acid in quantity according to the inverse ratio of the "stroke, which almost instantaneously gives up its oxygen to the "sulphureous acid gas, converting it into sulphuric acid."

[Printed, 2½d.]

A.D. 1852, October 26.—N° 527.

KLEINSORGEN, Joseph Carl Frederic, Baron de.—"An "improved apparatus for indicating the variation of the magnetic "needle."

A mariners' compass is described and shown for this purpose, in which the "variation of the magnetic needle from the north" is indicated "by means of the south pole." The compass box is suspended in an arc from a frame, which enables it to have an oscillatory motion; a horizontal central movement is also given by a vertical axis in the frame, on which the arc is free to turn. The compass box is composed of glass cylinders, to which brass rings are fastened to support and hold it together; for a cover it has a lens, and is divided into two cylinders or compartments, one underneath the other. In the upper compartment is a fixed card, and a straight bar or "indicator" placed over the line of north and south on the card; the lower compartment contains a common compass card with needle fastened to it free to move on a pivot, and a vertical straight line marked on the glass cylinder coinciding with the north pole of the fixed card.

"With the instruments usually employed for taking the alti-"tude of the sun the exact noon time is to be found, and at the "moment at which this takes place it is to be seen whether the "shadow of the bar falls exactly on the south pole of the fixed "card;" the north pole of the compass needle having been brought into coincidence with the vertical line. "When this is

" the case the magnetic needle will point due north, but if the " shadow falls either towards the east or towards the west the in- " strument must be turned round on its vertical axis until the " shadow falls exactly on the south pole of the card, in which " case the easterly or westerly variation amounts to as many " degrees as the difference between the north pole of the needle " and the vertical line on the outside of the box."

" The use of the lens is to concentrate the sun's rays in cloudy " weather, and obtain the required shadow."

The lower compartment of the compass box has two glass cylinders, one within the other, with a vacuum between, " to pre- " vent the local attraction of the needle."

[Printed, 6½*d.*]

A.D. 1852, October 29.—N° 561.

WILSON, James Godfrey.—(*Provisional Protection only.*) " Improvements in signals to be used on railways, or for similar " purposes, and in the apparatus connected therewith."

A signal instrument, with wound-up clockwork and a pointer (extending both ways from the axis), has its semicircular dial graduated for 12 minutes. A passing train completes an electric circuit by depressing a lever, thus exciting an electro-magnet and releasing a locking piece from the clockwork. The clockwork continues in action, moving its double hand (half of which is only visible) from a zero mark till it has completed the 12 minutes and arrived at the other side of the dial, that is, until the locking piece is again inserted into its notched wheel. This instrument, by the above means, denotes "the time elapsed between the then passing " train and the train in advance, at the point or part of the rail- " way where the said signal may be fixed;" or "it can be set in " motion at any distance from the place it may be fixed, either by " an advancing or retiring train."

The signal instrument may be illuminated " by the electric " light, or other light, by the aid of reflectors," and the lighting or illuminating may be rendered "simultaneous and continuous " with the action of the signal."

[Printed, 5½*d.*]

A.D. 1852, October 29.—N° 566.

LE GRAS, Louis Napoleon, and GILPIN, William Lawrence.—(*Provisional Protection only.*) "Improvements in trans-
"mitting electric currents," consisting "in making use of water
"as a conductor of electricity, in place of wires, as now ordinarily
"employed."

The water is placed "in a tube of gutta percha or other
"non-conductor of electricity, or in a metal tube, protected
"internally by a coating of gutta percha or other non-conducting
"substance."

"In the case of a submarine telegraph," "three or four water
"tubes" are placed together; "and in order to prevent any strain
"from rending the tubes or breaking them," ropes are used,
"running the whole length of the telegraph," and they are made to "bear the strain."

[Printed, 2½*d.*]

A.D. 1852, November 1.—N° 595.

WATSON, Joseph John William, and SLATER, Thomas.
—"Improvements in galvanic batteries, and in the application of
"electric currents to the production of electrical illumination and
"of heat, and in the production of chemical products by the
"aforesaid improvements in galvanic batteries."

The galvanic batteries described are, as a whole, called the "'chromatic battery,'" as the greater part of their products are pigments; these batteries consist of the following arrangements:—

1st. In a "'Maynooth battery,'" (composed of iron, nitric acid, dilute sulphuric acid, and zinc,) "a salt of cyanogen," preferably ferro-cyanide of potassium, is added to the ordinary exciting agents. The pigments produced are of a blue color, viz., Prussian blue and "ferro-prussiate of zinc." The nitrous fumes are used to convert sulphurous acid into sulphuric acid; or they may be conveyed into a leaden chamber, lightly filled with wood shavings, and converted into acetic ether by means of ammonia from other batteries; or they may be conveyed on to iron plates in the presence of water, thus forming nitrate of iron.

Sulphuric acid alone may be used in this form of battery; or the iron may be placed in the porous cell, with the zinc for an outer cell.

2nd. In a "Smee's" battery, with the elements lead (preferred to be platinized), nitro-sulphuric acid, and zinc, chromate of potash is added, the yellow pigments produced are "double chro-" mates of lead and zinc."

This battery may be arranged as the Maynooth battery, with lead instead of iron, and chromate of potash instead of prussiate of potash.

3rd. In an iron-zinc battery, excited with nitrous and sulphuric acid, chromate of potash is added, and the product is a *brown* pigment.

4th. In the "lead Smee arrangement," described under the 2nd head, prussiate of potash is added to the ordinary excitants. The white pigment produced is defined as "the plumbo-prussiate of " zinc."

When prussiate of potash is used in the lead Maynooth arrangement, a "ferro-cyanide of zinc" and a "ferro-cyanide of lead" are separately produced.

5th. To the chromate of potash lead battery is added a small portion of caustic lime, which reduces the chromate of lead to a subchromate; thus enabling a bright scarlet pigment to be produced.

6th. In an iron-zinc battery, if prussiate of potash be added to the iron cell, and chromate of potash to the zinc, the resulting products, having access to each other through a diaphragm, will give a green pigment.

7th. Nitrate of iron (See 1st head) is used in the iron cells of a Maynooth battery; in this case the cyanogen or chromium salt is added to the zinc cell only.

8th. Iron and zinc are used with sea-water and other mineral waters; prussiate of potash is added.

9th. A mixture of sulphuric and hydrochloric acids are used to excite the zinc; prussiate or chromate of potash are the color-making salts. In this battery the zinc need not be amalgamated; this is, however, necessary in the other batteries.

Plaster of Paris is manufactured by running the sulphuric acid washings of the battery solutions (after the crystallization and separation of the salts) on to finely powdered chalk.

The chromates of lead, zinc, &c. may be converted back into chromate of potash by fusing them with caustic potash. The oxide of lead produced is converted into white lead by passing the carbonic

acid from the decomposition of the chalk in the plaster of Paris process through water in which the oxide is suspended.

To brighten and give tints to the above pigments, sulphate of manganese dissolved in strong sulphuric acid is used to impart a purple shade to the blues; sulphate of alumina or alum brightens the blues; and chloride of "strontian" or of barium brightens the yellows.

In the "lead Smee" batteries a gutta percha trough, with a supply trough above the cells, and cocks at the bottom of each cell, is used.

The nitrous fumes are collected from the batteries by means of "a false gutta percha cover," in which is a tray or chamber containing quicklime and caustic potash; the nitrous fumes enter the chamber by "trumpet-mouthed apertures."

In electric lamps (See N° 212, 1852) a "counter convection" of the electrodes is caused by using two batteries, and applying opposite poles from different batteries to each electrode; this principle may also be made available for other purposes.

Electric currents are applied to the purposes of heating by passing them through fine "platina" or iron wires, which are coated slightly but perfectly with pipe clay or plaster of Paris; the wires thus coated are again encompassed by silver or silvered copper rods.

[Printed, 4½d.]

A.D. 1852, October 2.—N° 613.

BIANCHI, Maurizio (*a communication from Augustino Carrosio*). —(*Provisional Protection refused.*) "Improvements in electro-"magnetic apparatus for generating gas, applicable for motive, "lighting, and heating purposes."

"The nature of the invention consists in certain new arrange-"ments and combinations of electro-magnetic apparatus for the "decomposition of water, whereby a rapid and continuous supply "of gas is generated, which, applied to an engine almost similar "in construction to the ordinary steam engine, produces an effi-"cient motive power; it forms also an excellent lighting and "heating gas."

[Printed, 2½d.]

A.D. 1852, November 5.—N° 652.

YOUNG, James Hadden.—"Improvements in weaving," in which the shuttle of a circular loom may be caused to travel

etween two "combs," as on a race, by means of magnetic or electro-magnetic attraction.

"A perpendicular shaft" revolves "on itself, in the centre of a " circle of suitable dimensions," around which warp threads are arranged parallel to the shaft, the warp being held in a framing. At right angles to the shaft, four or more arms radiate, each having a magnet (or electro-magnet) at its extremity; "also various " inclined planes, arranged tangentially to the circle described by " the arms." "The warp threads being held at the *top of the* " framing," pass through harness, then through a comb serving to separate them, which is fixed instead of being moveable, as in the common loom. Immediately underneath this comb is a second comb, "whose teeth instead of extending across, as in the first," are "cut in the middle; the teeth of the external part radiating " inwardly, those of the internal radiating outwardly. Resting " on and between these two lower combs" a shuttle travels, as on a race; this shuttle may either be acted on by magnetic attraction, or by a mechanical means described and shown, "the warp threads " preventing any other connection." Beneath this arrangement two combs are placed, "one above the other, and as close as " possible, their teeth radiating from the inner circle outwardly," and immediately beneath them the woven material commences.

Instead of a magnet being used, the race may be formed of soft iron points wound with insulated copper wire; the points are then made magnetic in succession by the two poles of a galvanic battery, which poles are carried by the arm.

The action of the mechanism is as follows:—

1st. "The shaft rotating with its arms," causes the shuttle (by means of the magnet or otherwise) "to move round between the " inner and outer warp threads, laying the weft down on the comb " the lowest but one."

2nd. An inclined plane causes "this comb to move inwardly " along a radius of the circle," and thus allows "the weft to fall " on the lowest comb."

3rd. An inclined plane then causes "this comb to return to its " place, and the weft" is thus "between the two combs."

4th. An inclined plane moves the lowest comb inwardly, and thus allows the weft "to fall on the woven material."

5th. The lowest comb is "pushed in its original position," and " at the same time" is "slightly depressed," so as to beat up the weft. Two combs are used here to steady the warp.

6th. "An inclined plane, acting on the harness and its con-
" nection," causes "the warp of threads to change sides and
" cross over the weft laid down."

[Printed, 1*s*. 8½*d*.]

A.D. 1852, November 8.—N° 675.

CROWLEY, JONATHAN SPARROW.—(*Provisional Protection only.*) "Improvements in the means of or apparatus for working " the signals and switches on railways."

"The invention consists in working the signals on railways by " means of the flanges of the wheels of any carriage that is " allowed to run thereon. The flange of the wheels will, in " passing along the rail, come against and act on a lever which is " in connection with the signal apparatus. This signal apparatus " is of the ordinary construction, and the signal of 'caution' is " always kept up by means of an electro-magnet, which will hold " down the lever that works the same, but immediately a carriage " passes along the line, and allows the flange of the wheel to " strike the first-mentioned lever, the electric circuit is broken, " and the power of the electro-magnet being thereby destroyed, " the signal lever will be released, and the signal of danger will " immediately be brought up by a weight, and will remain up " until the circuit is again completed, and the signal lever is again " brought down and held in its place by the electro-magnet. In- " stead of causing the breaking of the electric circuit to work " merely a visible signal, the apparatus may be made to act on a " bell or other audible signal at the station or other part of the " line.

"The switches are worked in a similar manner to the signals, " with this difference, however, in the arrangement, that is to say, " the switches or points are held in a given position by means of " a powerful electro-magnet, and the electric circuit is completed " or broken, as may be deemed most desirable, by causing the " flanges of the running wheels to come in contact with and de- " press a lever or arm suitably placed on or near the line of rails, " and by so doing the electric circuit will be broken, and the " switches or points may be either worked by an attendant or " they may be brought into any given position by means of " weighted levers."

[Printed, 2½*d*.]

A.D. 1852, November 8.—N° 679.

HOGA, STANISLAUS.—(*Provisional Protection only.*) "An in-"strument for ascertaining the existence of gold in the earth."

"A rod of some conductor of electricity" is made use of, "and "wherever gold is supposed to exist in the earth," it is inserted, "and the presence of that metal will be immediately indicated "by the completion of the electric circuit."

[Printed, 2½d.]

A.D. 1852, November 9.—N° 680.

HENLEY, WILLIAM THOMAS.—"Certain improvements in "electric telegraphs, and in the apparatus and instruments con-"nected therewith," relating to:—

1st. Suspension and insulation of telegraph wires. Non-conducting sheaves or rollers are fixed to the posts or supports by screws or holdfasts through their axes, "so that in the movement "of the sheaves or rollers on their axes the wires can be readily "brought parallel with each other;" or a part of a sheave may be screwed fast to the post. In another insulator the holdfast is turned upwards, and a stout thimble of gutta percha (with a deep notch for the wire) placed thereon. A fourth insulator, for use on curves, consists of a thimble of iron or zinc placed over a thimble of gutta percha on the holdfast; the wire being fixed by a screw tapped into the metal thimble. A fifth insulator consists of a thimble of gutta percha, lodged as before, with a hole through it for the wire.

Non-conducting shackles (used at stations to break the continuity of the wire) consist of a solid piece of gutta percha inserted into metal hooks with "deep champferred" holes, and having the ends spread out by heat to fill up the champfers; or two metallic hooks, with loops or eyes, have a strip of gutta percha passed through them, and its ends joined by heat.

To give the wires the requisite degree of tension, a rack moving in a guide-piece, and actuated by a pinion, is used,—the guide-piece being attached to a telegraph post; the wire is clamped to the end of the rack. A similar apparatus is used to draw the ends of a broken wire together. Spiked rollers, moving a band or chain on which the wire is clamped, may be used; or a semi-circular rack with a long arm grasping the wire.

2nd. "The protection of electric telegraph wires when laid "under ground or through rivers." Gutta percha coated wire is "lapped" with tarred yarn, then with galvanized iron wire in "opposite spiral" [helical ?] "directions." Troughs for under-ground wires and their covers are preferred to be made of rolled zinc or galvanized iron.

3rd. Telegraph instruments. A reversing handle or key consists of a metal axle with two studs or lugs projecting in opposite directions; the lower one deflects against a notched piece of brass (in connection with one battery pole), the upper against one of two springs (in the line-wire circuit). The springs, in their state of rest, bear against a metal pillar in connection with the other battery pole.

In mounting magnetic needles to give signals, two of them are fixed on a horizontal axis, one in front of the dial, the other behind; two flat coils are placed between the needles, one at each end, "in the same plane as the needles, but with their "axis" [axes ?] "placed at right angles to them."

4th. A telegraph battery. The plates are fixed "on an insulated "axle," with felt between each pair. This battery is only used when removed from the fluid.

[Printed, 9½d.]

A.D. 1852, November 12.—N° 720.

FLETCHER, Henry.—(*Provisional Protection only.*) "Improve-"ments in the application of electro-magnetism for the pro-"duction of motive power."

"One or more series of discs, plates, or pieces of iron or other "magnetizable substances, which may be converted into electro-"magnets by coils of electrized wire, or in any convenient manner "as may be found practicable," are connected "by bolts, rivets, "links or other similar contrivances composed of a non-magnetic "material or substance, and so arranged that the discs, plates, &c. "are capable of being separated to any determinable distance "from each other, and at the same time are free to move in "proximity or come in contact.

"On presenting this arrangement of the plates, discs, &c. to "the influence of an electro-magnet, the first of the series, or that "nearest the magnet, will be attracted thereto, at the same time "drawing the remainder of the series with it; the second of the

" series will then be attracted also, drawing the remainder, and so " on to the last, to which suitable apparatus" is attached "for the " application of the power developed.

"When the electric current around the magnet or magnets is " broken, the series of discs, plates, &c. in contact may be " separated by connecting another similar arrangement of appa- " ratus acting in an opposite direction, or by means of other " suitable contrivance.

"This invention is applicable to producing or obtaining motive " power generally for any purpose or manner that may be required; " also for raising weights, as water, hammers, &c., which would fall " by gravitation when the electric current was broken, and other " similar purposes."

[Printed, 2½d.]

A.D. 1852, November 13.—N° 740.

DUNDONALD, Earl of. — " Improvements in apparatus for " laying telegraphic or galvanic wires in the earth."

"This apparatus consists in a suitable carriage, having a cutter " or coulter for vertically parting the earth, and an horizontal tool " attached thereto, similar to that of the drain plough, whereby " an aperture or channel is formed. From the upper and fore- " most part of the carriage a tube descends obliquely to the after " part of the *tool*, through which oblique tube covered telegraphic " or electric wire may be introduced, and continuously deposited in " the channel or aperture, as it is formed by the progressive or " onward movement of the apparatus, whether used on dry land " or under water, by animal force, or dragged by mechanical power " afloat."

The Drawings represent a coulter or cutter attached to " a beam " of wood or other material" "whereby to maintain the apparatus " in a position parallel to the surface along which it may be " moved." "A wheel" "may be added to support part or the " whole weight of the carriage."

"A frame on wheels," with one or more drums or reels on its axle, carries the insulated wire.

In submerging wire under water by the plough, "the carriage " may be towed (or connected) by a hollow rope, through or along- " side of which the coated iron" [wire?] "may be conducted" to the oblique tube, and deposited in the channel.

[Printed, 4½d.]

A.D. 1852, November 15.—N° 750.

MIRAND, JOHN.—"Certain improvements in the construction "of electric apparatus for transmitting intelligence," consisting of:—

1st. A "telegraphic bell." An electro-magnet attracts a keeper, by that means breaking the electric circuit; the spring carrying the keeper then forces it against the spring conveying the current; the action is repeated as long as the electric circuit is completed at the place of transmission; thus the bell is rung, a hammer being fixed to the keeper for that purpose.

Another arrangement is described and shown, in which a shaft carrying a horseshoe electro-magnet (by passing through its back plate and between its coils) is rotated by a fixed horseshoe electro-magnet mounted in a similar manner; for this purpose a commutator is fixed on the shaft. A cam fixed on the end of the shaft acts on a lever on the hammer axis, and rings the bell.

2nd. An indicating apparatus having numeral plates to indicate where the signal made by a "telegraphic bell" comes from. An electro-magnet is placed behind each numeral plate, the plate of the excited electro-magnet drops, and discloses its number to view. The observer of the number then raises the plate, thus establishing a circuit that causes a plate, with "go on" printed on it, to appear to the original communicator. For this purpose each electro-magnet has a keeper with a projection that bears up the numeral plate, except when the circuit is completed; when the plate is risen, it makes contact with a spring connected with the circuit so as to exclude the bell apparatus, and returns the signal "go on" by similar means to that employed in the numeral plates.

3rd. "Commutator" arrangements. Various commutators are described and shown, to be used in conjunction with the indicating apparatus, one to each electro-magnet. When these apparatus are intended to receive signals they have an electro-magnet to make connection from the place of transmission. The connection is made by means of springs and studs.

4th. A method of communicating between the guard and engine-driver of a railway train. The "telegraph bell" above mentioned is included in the circuit, so that the engine-driver would be apprized of the separation of any carriages from the train; a "supplementary battery" (which is, under ordinary circumstances, in constant action) is placed in the last carriage, and battery con-

nection is made with the alarum on the engine, when the breakage of the supplementary battery circuit liberates the keeper of an electro-magnet.

A method of making electric connection between each railway carriage consists of hooked rods attached to helical springs, and working through them in spring boxes.

[Printed, 11½d.]

A.D. 1852, November 17.—N° 778.

PHYSICK, HENRY VERNON.—" Improvements in electric tele-" graphic apparatus and in machinery or apparatus for con-" structing the same."

These improvements relate to insulating and protecting telegraph wires, by drawing them through a die or series of dies of a peculiar form.

This die or "triblet" is shown square in cross section, and is composed of six flat pieces, which are bolted together to form the whole die; each piece has a different shaped opening in the centre, so as to form a die when bolted together, with two external openings at one end, a "tongue" near the middle, and a single opening at the other end.

Wire is coated or covered "with calico cloth or other fibrous " material saturated with gutta percha, shellac, tar, pitch, or " similar insulating material," by the following process:—The end of a long narrow strip or ribbon of the insulating material is passed through the curved slot or opening at one end of the die, and brought out at the opening at the other end; the end of the wire is introduced at the circular opening above the slot, passed under the tongue, and out at the other end of the die; "the wire " and ribbon are then fixed in a vice attached to a rope, the other " end of the rope is attached to a revolving drum," and thus the wire and ribbon are drawn through the triblet, the ribbon being curled round the wire and overlapped in its passage. The whole is well compressed together before it leaves the triblet. The triblet is kept warm during the operation.

Insulated wire is exteriorly coated in a similar manner with a ribbon of iron or copper; in this case no heat is used.

In some cases a portion of the insulated wire intervenes between the separate lengths of covering, thus confining any defect in insulation to the length in which it is.

[Printed, 5½d.]

A.D. 1852, November 19.—N° 788.

WILLIAMS, WILLIAM.—" Improvements in electric telegraphs."

" This invention consists of combining line wires with electro " magnets, in such manner that the line wires used are soldered to " or otherwise in metallic contact with the coil of wire wrapped " round the iron or other bar in forming an electro magnet; the " two line wires being respectively connected to the electro magnet " wire near where it commences to make the coil, and near where " it departs after making the coil."

The Drawings represent a bar electro-magnet with three coils of insulated wire wound on it; the middle coil is of large wire, the two ends of which " are put in metallic connection with the two " ends or poles of a battery, when an electric circuit is to be com- " pleted, in order to convert the bar" " into an electro magnet;" and the two outer or end coils are of fine wire. The inner ends of the fine-wire coils are in connection " with the thicker wire used " for producing the electro magnet;" " the two line wires of the " telegraph are to be in metallic contact with the outer ends" of the fine-wire coils.

[Printed, 4½d.]

A.D. 1852, November 23.—N° 827.

KILNER, JOHN.—" Certain improvements in the means of insu- " lating the wires of electric telegraphs."

Insulators are constructed of glass, or of glass and metal combined, by means of moulds and tools of a peculiar construction, in which pressure is exerted upon the glass whilst in a state of fusion.

Insulators are formed with the " cap or bell" and stem in one piece, with a groove for the wire on each side; without the cap, the cap being cast separately and put on afterwards, with an aperture to carry the wires; or with the cap and stem, the wires passing over a groove at the top of the cap.

In the moulds described and shown for casting these insulators, the chief characteristics are, that they are made up of several pieces suited to the peculiar shape required; a hinged skeleton frame, having a catch attached to the bottom part of the mould, receives the glass before it is pressed into the mould; and the bolts for attaching the insulator to the post are cast into the insulators.

[Printed, 9½d.]

A.D. 1852, November 23.—N° 834.

WATT, CHARLES.—"Improvements in obtaining currents of "electricity," consisting of:—

1st. "Improvements in galvanic" [thermo-electric?] "batte- "ries." A thermo-electric battery is described and shown, consisting of a series of bismuth and antimony plates "combined "together end to end." The combined ends of the plates are placed in two compartments; all those facing in one direction are placed in a compartment to which cold air is admitted, the other ends are placed in a hot air or steam chamber. To ensure the metallic contact of the ends, one metal is cast on to the cleaned surface of the other, using chloride of zinc to facilitate the result.

2nd. A magneto-electric machine, in which electro-magnets are used instead of permanent magnets. The electro-magnet may be produced by the arrangement described under the 1st head, "or "by other form of battery." The chief peculiarity of this machine is that the armatures have a reciprocating motion to and from the poles of the fixed magnet (in this case an electro-magnet), as well as the usual rotary motion; this result is obtained by a shaft perpendicular to the armature axis, and connected by bevel gear to the driving shaft, carrying a cam, which works a forked lever between collars on the armature axis.

[Printed, 5½*d*.]

A.D. 1852, November 24.—N° 842.

BRACKENBURY, AUGUSTUS.—(*Provisional Protection only.*) "Making an electrifying machine of materials not hitherto used "for such a purpose."

"A sheet or riband of gutta percha of any size or dimension "is drawn forward and backward by means of steam or any other "suitable motive power, the sheet or riband of gutta percha is "placed between cushions made of silk or any other suitable "material, one of the cushions or set of cushions is stationary, "another cushion or set of cushions is placed so as to be pressed "moderately by a spring or weight towards the stationary "cushion or cushions; the sheet or riband of gutta percha so "placed between the cushions is moved forward, whereby both "the surfaces of the sheet or riband of gutta percha are

"rubbed by the cushions, and electricity is produced or excited "thereby.

"The machine that would produce the necessary forward and "backward movement could be effected by two rollers placed at "a distance from each other, with a handle prefixed to one of "them, and by two straps of any suitable material. The end of "one of the straps to be fastened to one of the rollers and the "other end of the strap to be carried round the other roller and "fastened to it. One end of the other strap to be fastened to the "last-mentioned roller, and the other end of the strap to be carried "round the first-mentioned roller, and fastened to it. By turn-"ing the handle, one end of the sheet or riband of gutta percha "being fastened to the roller, would be wrapped thereon; by re-"versing the motion of the handle, the other end of the sheet or "riband of gutta percha being fastened to the opposite roller, "would be wrapped thereon."

[Printed, 2½*d*.]

A.D. 1852, Nouember 24.—N° 849.

SEPTEUIL, Achille Jean Louis Hypolite Tourteau, Comte de.—(*Provisional Protection only.*) "Improvements in "the construction of electro-magnetic engines and in batteries."

The magnets employed "are composed of strips or plates of "metal bound together by thin strips of metal of about the same "width as the magnets themselves;" the Drawings show magnets of, apparently, a horseshoe form, with the strips or plates placed longitudinally; an L shape is also shown.

An engine is also represented, "composed of sets of electro-mag-"nets, of which one set is mounted on an axis free to revolve, and "the other set on a fixed frame;" the fixed magnets are shown arranged radially in the interior of a cylindrical frame; the move-able set of magnets are also arranged radially and concentric with the others, so that their poles come near to each other but do not touch. In a figure showing "the metallic bands" "wound upon "the magnets," they appear the same width as the magnets, and wound round several times, from the centre. "A current changer, "maker, and breaker" is shown, "mounted on the same axis as "the revolving set of magnets," and consisting of a non-conduct-ing cylinder, with inlaid pieces of metal (or a conducting cylinder

with non-couducting inlaid pieces), over which a roller in the circuit revolves; the magnets on the fixed frame "are rendered permanent magnets."

Square and concentric quantity batteries are also shown, in these it would appear that the plates can be raised by a winch; "a cistern filled with exciting fluid" gradually supplies it to the battery from above; the fluid is "as gradually drawn off from, the "battery. The exciting fluid can be used over and over again "by being pumped or otherwise returned into the cistern."

[Printed, 4½d.]

A.D. 1852, November 29.—N° 907.

SCHNEITER, Jean David.—"Improvements in maps and "charts," in carrying out which "*electro-plating*" may be resorted to.

"'Maps in optical relief'" are produced by preparing and modelling "a map of any country in relief. This bas relief being "reproduced im metal," is copied "by a medal-engraving machine of sufficient size, This engraving being completed on a "metallic plate coated with the usual preparation, various shades "are imparted to it by means of diluted nitric acid." "All the "details" being inserted "in one or several divisions," impressions are taken "in one or several colors, which are obtained by "lithography, or in typography by means of the counter impression of the engraved plates. This process can be applied to "globes, to copying charts and other maps."

In another part of the Complete Specification, it is stated that the "bas relief" above mentioned (modelled in "wax or a mixture of white of zinc and strong paste") has consistency given to it "either with strong paste, or by taking a cast in iron, copper, "or lead, or by electro-plating it, so that a metallic point may "pass over every feature without injury."

[Printed, 3½d.]

A.D. 1852, November 29.—N° 909.

BROWN, William.—(*Provisional Protection only.*) "Improvements in electric telegraph instruments."

"This invention consists of means of giving motion to pointers
" by electro-magnets. The keeper or armature of each electro
" magnet moves on an axis, from which rises an arm, which
" carries a stop, which is at all times between the forked end of a
" magnetic needle, when the armature is attracted by the magnet,
" and when the needle is also attracted and repelled by the poles
" of the electro magnet in a direction according as the current of
" electricity is passed in one other direction, and the needle is
" stopped at zero, by the pressure of the arm of the armature
" being caused to press against the needle by the spring which
" moves the armature."

"In constructing the alarum apparatus, there is on the
" escape wheel axis a tube, having a ball therein, capable of
" running from end to end thereof, the effect of which is, that
" when the escape wheel is released, the ball by its gravity adds
" to the effect of the blow, and in being raised the ball tends to
" overcome the power of the wheel."

[Printed, 2½*d.*]

A.D. 1852, November 30.—N° 912.

JEFFS, William.—"Improvements in manufacturing letters,
" figures, and ornamental work, and in the mode of attaching
" the same to wood, stone, iron, and certain other materials," consisting in :—

1st. "Manufacturing letters, figures, and ornaments of cast iron
" or other cheap material, and in coating the same with brass or
" other more expensive material, the operation of coating being
" performed by soldering or cementing in the ordinary manner," in the Complete Specification it is stated, "*or by electro-*
" *plating.*"

2nd. "Several improved modes of manufacturing letters, figures,
" or ornaments, so as to facilitate the fixing of them to doors,
" signboards, and other articles."

3rd. "The application of gutta percha and papier maché to the
" manufacture of letters and figures for shop fronts and other
" similar purposes; also in the mode of attaching such letters
" and figures of gutta percha and papier maché to boards or
" other articles by nails or spikes."

[Printed, 5½*d.*]

A.D. 1852, December 3.—N° 940.

SEWARD, NOBLE.—"Improvements in applying hydro-pneu-"matic agency for obtaining motive power," in which electricity may be used to explode gunpowder, &c.

A strong air-tight chamber or chambers are placed at low-water mark, so that the rising of the tide causes a considerable compression of the contained air.

In conjunction with this means of obtaining motive power, gunpowder in the form of rockets, or other combustible matter or gases, may be exploded in a second chamber by electricity; thus the pressure is increased, suitable valves being used to shut off the connection with the water at the time of the explosion.

In the Complete Specification a description is given of a "hot "air chest," in connection with a third or compressed air chamber of the above described tidal apparatus. In the interior of the chest a piston and cylinder arrangement is placed, so that the pressure surface inwards (from the chamber) is smaller than the area for effective pressure outwards; thus the compressed air supplied to the chest is prevented from returning, and is rendered still more powerful by the heat of the furnace under the hot air chest. From the hot air chest the air is conveyed to any suitable machinery.

[Printed, 7½d.]

A.D. 1852, December 4.—N° 959.

MURDOCH, JAMES (*a communication*).—"An improved gal-"vanic battery."

A portable galvanic battery, "capable of great intensity within "a small space," is constructed as follows:—"Upon any suitable "non-conducting and non-absorbing surface, as gutta percha, "caoutchouc, varnished wood, horn, ivory, &c., are attached a "series of 'elements,' that is of pairs of plates of different "metals, say zinc and copper, in metallic contact at their conti-"guous edges or parts. Between the several pairs or elements "are inserted pieces of some absorbing fabric or substance, as "linen, felt, sponge, &c., intended to take up the fluid of the "battery, and between each two pieces of absorbing material is to "be left a space (which may be fitted up with some non-conduct-"ing substance) to prevent, as far as may be, the same body of "fluid from touching both the metals of one element. The ele-"ments, it is scarcely necessary to observe, are ranged in the

" voltaic order, and the same principle may of course be likewise " adopted for the construction of one single pair of plates."

The following arrangements are described and shown:—" A " 'slab' battery," in which " a plate or slab of gutta percha " has ribs, between which the elements and absorbing substance are forced, so as to be in the voltaic order, and to present a nearly flat surface. " A 'ridge' battery," in which the elements, in the shape of compound rectangular hoops, are forced over ridges or ribs in a gutta percha slab. " A 'frame' battery," in which the elements are placed transversely in a rectangular frame of gutta percha. " A 'cylindrical' battery," having the elements wound helically upon a cylinder.

A number of these batteries may be attached to a sheet of caoutchouc, or arranged in a box to obtain combined effects in a portable form.

[Printed, 5½d.]

A.D. 1852, December 8.—N° 996.

SYMONDS, John, and MOUCHET, George.—" An improved " mode of cleaning or scaling metallic surfaces."

" To avoid the waste and deterioration of metal " consequent upon the use of the ordinary modes of cleaning and scaling metallic surfaces, the articles to be cleaned are immersed in the pickle in metallic contact with an electro-positive metal, such as zinc, the zinc being in a porous vessel placed in the pickle.

A tank for cleaning iron or other plates is shown, in which the porous cell is in the middle, between two sets of plates that are wedged into guide frames having grooved iron notches. The arrangements are, however, varied according to the article to be cleaned.

The pickle employed is a solution of salt, with or without the addition of " sulphuric or muriatic acid ;" in the Provisional Specification it is stated " sulphurous or muriatic."

Cast iron may, in some cases, be used instead of zinc.

When several tanks are used, the zinc and articles to be cleaned are connected into a galvanic series.

[Printed, 5½d.]

A.D. 1852, December 9.—N° 1006.

PRICE, David Lloyd.—(*Provisional Protection only.*) " Cer- " tain improvements in apparatus for effectuating alarums and " signals by electricity," relating to :—

1st. An " indicator " for completing the circuit of a fire alarum

on undue elevation of temperature, by means of the difference of expansion by heat of a particular combination of metals. A curved compound metallic strip, made of steel and hammered zinc, is fixed to a bracket in the case of the instrument, and connected with one battery pole; the other battery pole is connected to a stud, with a screw adjustment, fixed to the opposite part of the case. On the elevation of the temperature above a certain point to which the stud is adjusted, the compound strip of metal straightens and completes the circuit. Modifications and applications of the apparatus to houses, railway trains, and on board ship are described and shown.

2nd. Alarum apparatus. An alarum is described and shown in which a pistol is discharged on the completion of the circuit by the "indicator." An electro-magnet, when excited, attracts its keeper, which is attached to a detent lever; thus a spring is enabled to act on a second lever that "discharges" the trigger of the pistol.

In a bell alarum, the detent lever is made to release a toothed wheel having a tendency to revolve by means of a weight; an escapement then gives oscillatory motion to the hammer lever.

3rd. Apparatus "for giving notice by alarum of the approach "of a train to a station." The depression of a lever by the wheels of a train completes the alarum circuit, and "discharges" the alarum at the station.

[Printed, 10½*d.*]

A.D. 1852, December 11.—N° 1032.

MORRIS, Timothy, and JOHNSON, William.—"Improve-"ments in depositing alloys of metals."

In this invention the electro-depositing solutions used contain a carbonate of ammonium (the sesquicarbonate is preferred) in combination with cyanide of potassium; to a solution of these materials is added "cyanides, carbonates, or other compounds" of the metals to be deposited in the requisite proportions to constitute the desired alloy. For brass, any of the above salts of zinc and similar salts of copper are added. For German silver, the compounds of nickel, copper, and zinc are added. Solutions for the alloys of gold, silver, &c., are made in a similar manner.

Instead of adding cyanides or other compounds of the metals to be deposited to the carbonate and cyanide solution, it may be charged with the metals by making a sheet of the alloy "the anode

"(in the solution named) of a powerful galvanic battery or mag-"
"neto-electric machine," and continuing "this operation till the "solution has taken up a sufficient quantity to produce a reguline "deposit."

It is preferred to use the solution hot, and to employ electric power and arrangements "capable of evolving hydrogen freely "from the cathode, or article attached thereto."

In brass, if the copper is deposited "in a greater proportion than "is desired," it is corrected by adding the ammoniacal carbonate, or by reducing the temperature; if the zinc is deposited too freely, cyanide of potassium is added, or the temperature increased. Solutions of other alloys are subject to similar control.

[Printed, 3½d.]

A.D. 1852, December 11.—N° 1035.

GRIFFIN, Charles.—(*Provisional Protection only.*) "Improve-"ments in obtaining metallic copper from its solutions formed by "nature, and in the various processes of purifying cupreous ores "by means of water."

"This invention consists in the application of an electrical "current to obtaining metallic copper, by depositing it on metallic "or other surfaces, from its solutions formed by nature, or in "the various processes of purifying cupreous ores by washing "them with water."

[Printed, 2½d.]

A.D. 1852, December 13.—N° 1046.

TALBOT, William Henry Fox.—"Improvements in obtaining "motive power."

This invention consists of an electro-magnetic engine.

"A heavy iron cylinder is made to roll upon a long but narrow "metallic table or plate, close beneath which a long row of horse-"shoe electro-magnets is placed. These magnets stand vertically "with their poles uppermost, so that as the cylinder rolls along "the plate, it unites the two poles of each magnet consecutively. "If the magnets are placed close enough together, and on a level "with each other, their summits will form a sufficiently firm "surface for the purpose required. The machine is so contrived "that the cylinder is always attracted forwards till it reaches the

" end of the row of magnets; the action is then reversed, and it
" returns in the opposite direction till it reaches the other end, and
" so on. The whole distance traversed by the moving cylinder
" makes one stroke of the engine. The cylinder communicates
" its force and motion to the rest of the machinery, by its axis
" being attached to a crank and fly wheel. The motion of the
" cylinder itself sets in action the contrivance (sometimes called a
" commutator, sometimes a rheotome), which magnetises the
" magnets that are before the cylinder, and unmagnetises those
" behind it."

The "commutator" arrangement is placed on each side of the row of electro-magnets, one for the up stroke, the other for the down stroke of the engine; the battery poles are put at the proper time into connection with the wires or "electrodes" on one side or the other by a self-acting rod and tappet motion in connection with the engine, which moves a "polar connecting piece" carrying the battery poles over the electrode ends. The axis of the cylinder carries a slide or "commutator," having insulated pieces of metal that respectively pass over the coil terminals and the electrodes. The coil terminals and commutator slides are so arranged that the magnets are magnetized in advance of the motion of the cylinder; the arms carrying them being oblique, and one slide being in advance, the other in the rear of the cylinder, for that purpose.

[Printed, 6½d].

A.D. 1852, December 22.—N° 1134.

KINGSTON, John Filmore.—" Improvements in obtaining " motive power by electro magnets," consisting of:—

1st. "An improved construction" of electro-magnets. Several plates of soft iron (or of nickel) are each bent so that the two parts become parallel, and are arranged and secured separately by brass rods on an insulated bed plate; "also bolts or rods of brass, duly
" secured at either end, are passed through the ends of the bent
" plates near their poles; and the poles of each magnet, and the
" poles of the neighbouring magnets, are kept apart by means of
" gutta percha." Insulated bundles of wires are used in preference to single wires in coiling these magnets, and they are wound round and between the soft iron plates, so "that the current passes in the
" same direction from end to end on one side of each plate, and
" in the opposite direction on the other side of each plate."

2nd. Electro-magnetic engine arrangements. Two "rotatory" engines are arranged "in such manner that the electric current, " when acting on the series of magnets of one engine, shall be cut " off from the series of magnets of the other engine." In these engines, the electro-magnets described under the 1st head are preferred, and all the electro-magnets in one set (or engine) act at one instant of time, instead of consecutively, as in ordinary rotary electro-magnetic engines. The electro-magnets belonging to each engine are fixed to a frame loose on the axis to which their keepers are fixed; each time the electric current is admitted to one set of electro-magnets, they are thereby rotated on the axle towards their keepers. The keepers are then moved away from the magnets by the action of the electro-magnets of the second engine; the electro-magnets of the first engine then act, and move the keepers of the second engine away from their magnets, and so on; thus, by the combined action and reaction of the two engines on one another, rotary motion is obtained.

Spur wheel gearing, connecting the two engines, communicates with the frames of the electro-magnets and with their axes by means of a ratchet-wheel and click motion.

A commutator, between the engines, and rotated by their spur gearing, having suitably placed inlaid discs and insulated rings, alternately cuts off the current from each engine and lets it on to the other.

[Printed, 1*s*. 0½*d*.]

A.D. 1852, December 24.—N° 1162.

WILSON, James Godfrey.—(*Provisional Protection only.*) " Improvements in the construction of carriages and vehicles for " railroads and common roads, parts of the said improvements " being also applicable to parts of locomotive engines used on " railroads," consisting of:—

1st. The application of whalebone tyres to the above-mentioned purposes.

2nd. Improving the ventilation of carriages.

3rd. "The application of gutta percha" "for pannelling and " interior fittings of carriages, as also for roofs of carriages or other " vehicles."

4th. " Constructing and applying breaks for railway carriages or " locomotives," so that the break comes in contact with the "side

" of the rim," or the " outside of the flange" of the wheel, instead of (as ordinarily) with the wheel's "perephiry."

5th. "The application of an arrangement whereby the face of " the break, being a piece of soft iron, and being made a magnet " by the ordinary arrangements and connection with a galvanic or " electrical battery, simultaneously with its being brought into " contact with the side of the wheel, or flange of the wheel to which " it was applied, attracts and holds the wheel."

[Printed, 2½*d.*]

A.D. 1852, December 28.—N° 1183.

JUNOT, Claude Joseph Edmée (*a communication*).—" Im- " provements in the mode of reducing several metallic substances " hitherto unused, and applying them so prepared to the plating " of other metals and substances by means of electricity."

" This invention consists of preparing silicium, titanium, " tungsten, chromium, and molybdenum, by causing them to be " dissolved, and then, by means of electric currents, to be deposited " on to metals and substances."

Tungstic, silicic, or molybdic acid is dissolved by boiling in a solution of carbonate of soda; to this a small proportion of carbonate of ammonium solution is added.

" Chromium is obtained in solution by double chloride of soda " and ammonia."

" Titanium is obtained in solution by sulphuric acid, which being " evaporated, sulphate of soda and ammonia" (" sulphate of soda " and alumina" is stated in another part of the Complete Specification), " with distilled water, is employed."

A " platina" positive plate is employed in the depositing trough; the strength of the solution is kept up by means of " a small bag " full of the metallic salt."

" These metals may be deposited alloyed together or with silver " or nickel, or other metal."

[Printed, 3½*d.*]

A.D. 1852, December 29.—N° 1196.

POWER, James.—" Silvering all sorts of metals and of glass."

This invention relates to preparing an electro-plating solution, in which alcoholic solutions of the gum resins (gum galbanum is

preferred) in combination with nitrate of silver, "nitrate of liquid "ammonia (hartshorn)" and ammonia are employed instead of the "cyanures" [cyanides ?].

To deposit on glass, a very thin coating of silver is first placed upon it, "by adding to the liquid a few drops of spirits of cloves in "a separate bath."

The silvering applied by this process to glass "does not change "with exposure to damp, or scale off with excessive heat;" an electro-coating of copper may be added to produce solidity in "the looking glass, mirror, or reflector."

"This coating of copper and silver upon the even and polished "surface of glass, on being detached from the latter, forms a "metallic plate of the most perfect polish, requiring neither "flattening nor polishing, and is most beautifully adapted to the "use of Daguerreotype and photographic portraits, views, &c[a]."

[Printed, 4½d.]

1853.

A.D. 1853, January 1.—N° 5.

WATSON, Joseph John William, and PROSSER, William.—"An improved method of manufacturing steel and of carbu-"rizing iron," consisting of:—

1st. "The use of electricity in producing carburisation in soft "iron to form steel and carburized iron." Some time after a mass of molten cast iron has been in contact with carbonaceous matter in such excess as to form carburet of iron, an electric current from a powerful galvanic battery is passed through it by means of graphite poles. The graphite used is that obtained "from the lining of the clay gas retorts." The furnace should be built of insulating materials. The action of the current is to reduce the cast iron to a purified steel of "the composition and "properties of shear steel."

In another mode of applying electricity, the ordinary converting troughs for making bar iron into steel are insulated, and a current is passed through the bars, in contact with the carbon, in the

direction of their length. The action of the current hastens the steeling, and prevents the formation of blisters.

In a third mode, iron is carburized by passing the current equably through the carbonaceous matter in connection with the metal by means of graphite or "platina" poles.

2nd. Using "the waste sulphate of manganese from the chloride " of lime stills with carbonaceous matter and lime to form steel," " either with or without the application of an electric current." Clippings of sheet iron, broken pieces of bar iron, and turnings and filings of cast iron are the materials operated upon in this process; they are mixed with certain proportions of charcoal, sulphate of manganese, and lime, "and operated on in the ordinary " steel pots." The lime forms "a base for the sulphuric acid " from the sulphate of manganese to unite itself to. The sulphate " of lime so formed floats at the top of the pot" in the shape of a protecting "slag."

If an electric current be passed through the fused mass, then all the earthy impurities of the iron "unite in the calcareous slag, " while the arsenic, phosphorus, and sulphur compounds are " volatilized and driven off."

[Printed, 3½d.]

A.D. 1853, January 4.—N° 16.

SHEPARD, Edward Clarence.—"Improvements in the ma- " nufacture of gas."

This invention consists of a mode of producing certain gases by electrical action upon water holding chemical matters in solution, and then combining those gases with a gaseous hydro-carbon (either with or without admixture of air), to enable the resulting combination of gases to produce light and heat.

The currents of electricity are preferred to be produced according to the Patentee's former inventions (See Nos 13,302 and 14,197, Old Law).

The materials added to the water consist preferably of a mixture of sulphuric acid with oxalic acid. The gaseous hydro-carbon preferred is that generated by the ebullition of "the essence of " resin;" "metallic sponges" are placed in the essence of resin to assist its conversion into gas. These sponges are prepared by soaking coke "in a solution of nickel or cobalt, well saturated, " and heated in covered crucibles."

[Printed, 3½d.]

A.D. 1853, January 5.—N° 23.

DE L'HUYNES, Gustave Paul.—" Certain improvements in " medical portative electro-galvanic apparatus."

In this invention each galvanic pair has cloth, saturated with the exciting solution, between the plates; the cloth also serves to " isolate " the plates. Each pair is connected to the next by putting the negative metal of one pair in communication with the positive metal of the next. The exciting solution may consist of " a solution of chloride of sodium, of hydrochlorate of ammonia, " or of sulphate of copper, or of any other acidulated solution."

The following apparatus are described and shown:—

A single cell, consisting of a copper plate between two connected zinc plates, in which wood cross pieces separate the plates. There are apertures in the outside plates, to allow of the easy saturation of the cloth.

Two cells, or galvanic pairs, constructed as above, connected by means of rings, and having helical spring insulated copper wire conductors, with brass plates, to apply to the part required.

"An electro-galvanic truss." Several of the above cells are combined and attached to the spring of a truss. Brass plates connected with the end cells of the series are inserted into the pressure cushions.

Six separate elements, forming three galvanic pairs, are connected together like a chain, with silk strings to bind the cloth and metallic elements together.

In a pair, consisting of three plates, the copper plate is cut, and admits rivets belonging to the zinc plates.

A tubular conductor for the rectum, and a probe conductor to reach the bladder.

[Printed, 1s. 2½d.]

A.D. 1853, January 6.—N° 31.

SHERINGHAM, William Louis.—" Improvements for illu- " minating buoys and beacons in harbours, roadsteads, and " rivers."

This invention consists in illuminating buoys and beacons by " the combustion of gas, volatile spirits, or any other suitable " hydro-carbon," in a lamp attached to the buoy, and ignited daily by an electric current.

When gas is used, pipes and electric wires are laid down from the shore, and the gas is ignited (when turned on from the shore) by the heating of a fine platinum wire in the electric circuit.

When mineral naptha is used, the buoy contains a large quantity of the material, also some "vegetable naptha." By an electro-magnet, a saucer is filled with vegetable naptha; and by a second conductor of the current, a platinum wire is heated sufficiently to ignite it; a third conductor extinguishes the lamp by electro-magnetic agency. The lamp preferred is "Messrs. Holliday's" naptha lamp.

Trap valves exclude the water, and syphons effect ventilation.

[Printed, 3½d.]

A.D. 1853, January 13.—N° 96.

WILKINS, John Walker.—"Improvements in electric telegraphs, and in the instruments used in connection therewith," consisting of:—

1st. A marking telegraph. A marker or tracer is "held continuously in contact with a moving recording surface," thereby producing characters connected together in a continuous line.

The tracer arm or lever is mounted on a centre, and has an armature attached to it. Fixed horseshoe electro-magnets are placed on each side of the armature, and actuate it according to the direction of the electric current from a distant station. By the lateral motion thus imparted to the tracer, it is enabled to produce characters distinct from one another, for when no electric current passes, the tracer merely produces a continuous straight line; but when an electric current excites the electro-magnets, the movement of the tracer to one side or the other causes the line to deviate from a straight line accordingly. If the current is continued for any time, a straight line is produced on one side or the other of the normal straight line, parallel to it; and by a combination of these movements, alphabetical or other characters may be formed.

A keyboard carrying two keys, acting by levers and springs, is described and shown. In a series of keyboards, the first can be worked by manual operation, and the others ("through the intervention of electro or other magnets") may "work other circuits, and so on ad infinitum." This keyboard can be used to work the marking telegraph above described.

An "automaton repeater," to further facilitate the working of the above-described recording apparatus, consists of a bar electro-

magnet having the similar poles of permanent magnets in proximity to its opposite poles. On the passage of the electric current through the coils of the electro-magnet, it attracts one of the similar poles and repels the other, the poles (or terminations) to the permanent magnets being moveable on centres for that purpose. Thus, by the contacts made respectively by the "pendant "poles," the circuit proceeding round the bar electro-magnet may bring into action other circuits or instruments.

2nd. Constructing "electric telegraph insulators with tubes of "glass or other material arranged concentrically around the core "from which the electric conductor is suspended, and having "spaces between them so as to form an extended non-conducting "surface between the point of suspension of the conductor and "the connection of the insulator with its support." Examples are described and shown, in which the tubes are of the same length, and of various lengths; in some, the suspending hooks also serve to fasten the insulator to the post, and in others, they merely enter the insulator.

A "Disclaimer and Memorandum of Alteration" was filed in the Great Seal Patent Office, on the 27th April 1854, by the Patentee.

The following alterations of the above-described Specification were made:—

In reference to the electro-magnets actuating the tracer lever, the original Specification states that "the *coils* composing the "magnets are connected in pairs." This sentence should be, "the *cores* composing," &c.

In reference to the same electro-magnets, a sentence is introduced, stating that when used separately, they may be worked either by two line wires, or by means of a single line wire and auxiliary current in connection with the "automaton repeater."

A sentence is introduced, stating that the ink used on the roller, over which the paper passes, should not adhere to the paper without pressure.

Paragraphs are also introduced and sentences altered, so as to show that the lateral movement of the pointer is not dependent upon the reversal of the current through the electro-magnet's coil, but upon a different pair of magnets being brought into action.

The acting on the keyboard by magnets is disclaimed.

Alterations are made in the description of the "automaton "repeater," tending more clearly to show how the moveable "terminations" complete the circuit of a local battery; and that the local or second circuit is distinct from that exciting the bar electro-magnet.

In reference to the description of the insulators, the original Specification states that the principle of action is, that the length of surface is increased "between the point of suspension and the "outside of the *conductor*," instead of "between the point of "suspension and the outside of the *insulator*;" the post to which the insulator is fixed is stated in the alteration to be a "wooden "post."

Another alteration shows more distinctly that it is the *combination* of the elements of the invention that constitute the improvements.

[Printed, 1*s*. 0½*d*.]

A.D. 1853, January 14.—N° 100.

VRIES, JOHN HENRY.—(*Provisionl Protection only.*) "Improve-"ments in obtaining motive power," which relate to:—

1st. "Obtaining motive power from gases evolved in the "decomposition of water and other matters in combination with "compressed air, the whole being charged with electricity while "in the generator." To evolve the gases rapidly. "muriate of "soda" and "nitrate of potass" are combined with the water. The "generator" used is a cylindrical vessel, which is half filled with water holding the above-mentioned salts in solution. Air is introduced into the generator by the engine when in motion. The gases are charged with electricity generated by the friction of two metals moved by the engine, also with "electricity obtained from "the earth or the sea and atmospheric electricity."

2nd. "An improved rotary engine." An "annular chamber "is supported on hollow arms through which the exhaust "elastic fluid escapes to that end of the hollow shaft forming the "exit." A tube is "placed diametrically" within the above-mentioned chamber, to which reciprocating motion is given, thereby forming valves at each end, and regulating the admission of

elastic fluid to the annular chamber. The gas is, by this means, admitted alternately to either half of the engine, and rotary motion is thus produced.

[Printed, 2½d.]

A.D. 1853, January 17.—N° 110.

POTTS, Thomas, and COCKINGS, James Septimus.—"Improvements in the manfacture of tubes, and in the application "of tubes to certain purposes," consisting of:—

1st. A "mode of making tubes for locomotive boilers."

2nd. Making tubes so that they may be applicable as "calico "printing rolls."

3rd. "The application of hollow or tubular copper wire for "telegraphic communication." In joining the lengths a short outer tube is placed so as to reach over the joint equally on each side; necks are then formed by means of pliers, on each side of the inner joint, thus making a strong and firm connection. This part of the invention is stated to be "equally applicable to common "bells, as to electric or any other telegraphs."

[Printed, 6½d.]

A.D. 1853, January 18.—N° 119.

BINKS, Christopher.—(*Provisional Protection only.*) "Improvements in producing electric light," consisting of:—

1st. Forming the electrodes of several points of charcoal or other material. It is preferred to have a single rod of charcoal for the "'non-consuming'" electrode, and several rods for the "'wasting'" electrode.

2nd. "The use of *lignite* carbon for electrodes."

3rd. Forming "carbon electrodes by covering metal with a "coating of carbon."

4th. Attaching one or both the electrodes to a stem or stems floating in a liquid; the stem is balanced, so that as the carbon is burnt away it rises out of the liquid, thus adjusting the distance apart of the electrodes.

5th. Using a rod for one electrode and a cylinder or tube for the other, or using electrodes so that the end of one electrode and the nearest point of the other generate the light.

6th. "Using the metal mercury for the electrodes," or mercury falling upon charcoal. The vaporized metal is condensed, collected, and used again.

7th. Imparting, by any available motive power, a very rapid, vibrating, oscillating, rotary, or other movement to one or both the electrodes, so that they may continally cross the point of maximum light, but stop short of actual contact.

8th. By any convenient means causing the electrodes to make and break contact so rapidly that an apparently continuous and uniform light is obtained.

[Printed, 4½d.]

A.D. 1853, January 21.—N° 149.

EDWARDS, ELIEZER.—(*Provisional Protection only.*) "An "improvement in the construction of knobs, handles, and other "articles of glass, earthenware, and other vitreous and semi-"vitreous substances, and in attaching the same to doors, drawers, "and other articles."

This invention "consists in making the screws by which knobs, "handles, &c. of glass, earthenware, or other vitreous or semi-"vitreous substances are attached to doors, drawers, &c. in one "piece with and of the same material as that of which the said "knobs, handles, &c. are made."

This invention is applicable, amongst other things, to "*the in-"sulators of electric telegraphs.*"

[Printed, 2½d.]

A.D. 1853, January 22.—N° 169.

DESVIGNES, PETER HUBERT, and KUKLA, FRANCIS XAVIER.—"Improvements in galvanic batteries."

"This invention has for its object the use of metals in the "construction of galvanic batteries more highly electro-negative "than gold or platina, and consists of applying the metals tellu-"rium, chromium, vanadium, uranium, molybdenum, tungsten, "wolfram, columbium, tantalum, titanium, palladium, rhodium, "iridium, osmium, and antimony in constructing galvanic bat-"teries. Lead zinc, tin, or other metals electro-positive in "respect to such metals, may be used with such electro-negative "metals."

In carrying the invention into effect, it is preferred to use antimony "wrought to a smooth and fine surface" as the negative plate; the other elements may be, concentrated nitric acid, solution of common salt, and zinc. Antimony, concentrated nitric acid, dilute nitric acid, and lead; antimony, concentrated hydrochloric acid, dilute hydrochloric acid, and zinc; or antimony, semi-diluted sulphuric acid, and zinc, are the other galvanic circles mentioned.

In the preferred arrangement, the antimony rod is placed in a porous cell having a "bell-shaped cover of gutta percha" immersed slightly in the fluid of the outer cell, "so as to prevent "the escape of nitrous acid gas as much as possible;" peroxide of manganese is occasionally placed in the porous cell; and the porous cell is kept in its position by a thin perforated plate of gutta percha.

Alloys of antimony and of the above-named metals may also be used.

[Printed, 2½d.]

A.D. 1853, January 25.—N° 185.

HENLEY, WILLIAM THOMAS.—"Improvements in covering, "laying, and uniting wires and ropes for telegraphic purposes, "and in the machinery employed therein."

This invention relates to covering gutta percha insulated wires with iron wire twisted round "as harp strings are covered."

A frame supports horizontal shafts or mandrils, made hollow for the wire to pass through, carrying face plates, on which are fixed bobbins for carrying the wire.

In one covering machine, two coatings of tarred yarn are laid on in opposite directions. The covered wire is conveyed away from the machine by a "drawing pulley," actuated by a screw working into a screw wheel on its axis.

In a second machine, for laying two coatings in opposite directions, motion is conveyed to the "drawing pulley" by bevil and spur gear. In both these machines the insulated wires are laid parallel.

In a third machine, bobbins containing the insulated wire are mounted on a face plate; thus giving it a twist "for making the "ordinary telegraph wire rope."

For subterranean wires, the helical covering of wire has a very

short pitch; but for submarine wires (where great lateral strength is required), it has a very long pitch.

A Drawing referred to, showing drums from which the wire is unwound before covering, and on to which it is wound after covering, is imperfect.

Another improvement consists in making submarine cables in short lengths, connected together by iron clamps bolted together or by screw joints.

In laying telegraphic wires, a truck ("drawn by horses"), carrying the wire drum on transverse spindles, is used, and arrangements of wheels and pulleys guide the wires into the trench.

It is proposed to lay down the helically-covered wire at once in the trench, without a trough or pipe, and to cut the trench and deposit the wires by means of a blade. The blade is to be propelled by means of a chain attached to a revolving drum of a fixed steam-engine; the engine is, however, portable when not used for propelling the blade. This method is only used in the country.

An air-tight cast-iron testing box is used, the lid being bolted to the box with a vulcanized India-rubber washer between. The wires are covered with gutta percha, which is opened at the time of testing, and afterwards closed.

[Printed, 11½d.]

A.D. 1853, January 25.—N° 191.

SIEVIER, Robert William, and WAITHMAN, Robert William.—(*Provisional Protection only.*) "Improvements in "bleaching animal and vegetable fibrous materials."

The improvements consist of the application of "the acetates, "muriates, and sulphates, or the salts of metals," "to the "matters, which are afterwards to be treated with chlorine or "chlorides," then "they are treated with sulphurous acid gas, or "sulphuric, nitric, or muriatic acid;" these materials apply to vegetable fibrous matters.

"For the bleaching of animal fibrous materials (such as wool, "hair, &c.)," "ammonia or other alkaline substance" is employed "for extracting the grease;" then the materials are treated with "oxalates or borax," afterwards "with sulphurous acid gas, "or the acids as above."

"In acting upon both the vegetable and animal substances, as "above described," the process is occasionally assisted "*by the* "*aid of electricity*."

[Printed, 2½*d*.]

A.D. 1853, January 26.—N° 199.

NOLET, Charles.—(*Provisional Protection only*.) "Improve- "ments in indicating time."

"This invention consists in the application of electric currents "which are alternately broken and established by a prime regu- "lating timekeeper, for the actuating of any number of separate "timekeepers."

"This is effected in the following manner:—A battery is placed "in connection with a regulating clock or chronometer, and the "current passes through it to a series of other time indicators by "wires laid down for the purpose." "The mechanism for actuating "the hands of the various time indicators consists simply of the "ordinary dial wheels of a clock for giving the two speeds re- "quired for the hour and minute hand, and a ratchet wheel and "palls. The palls are fitted to a plate, on one end of a vertical "vibrating lever, which works on a fixed centre at its lower "extremity. This lever forms an armature to an electric magnet, "and is attached" [attracted?] "thereto whenever the current is "established, and drawn back again by a spring when the current "is broken; thus as the current is being constantly established "and broken at all the different clocks by any simple contrivance "in the main or prime regulating clock, it follows that all the "different armatures will be caused to vibrate simultaneously. "This vibration gives motion to the ratchet wheel in each indi- "cator;" the ratchet wheel is thus "moved forward one tooth for "every forward, and another tooth for every back movement of "the armature." Two detents "take into the ratchet wheel after "every movement."

[Printed, 2½*d*.]

A.D. 1853, January 29.—N° 229.

WHISHAW, Francis.—"An improved lock or system of locks."

This invention consists in locking the locks of doors, &c., by means of electro-magnetism. An electro-magnet on the jamb frame of a door, on being excited, becomes attached to a soft iron plate let flush into the inside of the door.

The bolt of an ordinary lock, or an ordinary bolt, may be used as the keeper plate; in this case the bolt will be unable to be withdrawn (having been shot forward) until the current ceases.

[Printed, 2½d.]

A.D. 1853, January 29.—N° 231.

BROOMAN, Richard Archibald (*a communication*).—"Im-" provements in diving bells, and apparatus to be used in con-" nection therewith."

This invention is applicable to "laying pipe or" [*electric?*] " *telegraph wire.*"

The following points are observable in respect to the apparatus:—

The diving chamber is connected with a reservoir of compressed air (which floats on the surface of the water) by means of a hollow-shafted windlass and flexible tube.

A series of tanks are in the diving chamber, connected by air and water pipes, so that they may be filled with either element at the will of the operator. By this means the depth of the apparatus below the surface may be adjusted or altered.

The traversing motion along the bottom is obtained by means of an anchor and "propelling rudder." A cable, passing over a traversing sheave into the chamber, connects the apparatus with the anchor; the "propeller rudder" consists of a screw mounted on an universal joint.

A second chamber may be placed "below the lower opening" of the diving chamber, "to act as a moveable coffer dam;" in operating with this attachment, "the lower edges of the chamber" are forced down into the sand at the bottom." The interior space may then be excavated, and telegraph wire laid, or other work done. "The diving chamber is then raised, and the coffer dam advanced to the next step," &c.

In laying telegraph wire, the ends of the coffer dam may be removed, and the sides allowed to fall in; the sand thus fills up the trench, and the wire is below the reach of anchors.

[Printed, 8½d.]

A.D. 1853, January 29.—N° 234.

HEWITSON, William Watson.—"Improvements in sus-" pending or applying mariners compasses in vessels built of" iron or partly of iron."

This invention consists of suspending the mariners' compass in such a position that it will be at or near the "neutral "axis of that portion of iron which forms part of the ship, "and which portion is cut by a vertical line passing through "the binnacle or compass; and at right angles to the keel." By this improvement, when the vessel is laid over on either side, it does not affect the compass needle, as the influence of the iron over it is equal in every direction.

"For this purpose the compass is placed so low in the vessel as "to be at the neutral axis; and in order that the man at the "wheel may see the card of the compass, a conical funnel is "carried up through the deck or decks, having an eye-piece at its "upper end" to exclude water, and to enable the man at the wheel "to look down and see the card without leaving his "place."

"There is also a lamp (with reflectors) constantly burning near "the compass."

[Printed, 5½d.]

A.D. 1853, February 4.—N° 303.

PRICE, David Lloyd.—(*Provisional Protection only.*) "Improvements in signalling by electricity on railway trains and "railways, and in the appliances used therein," consisting of:—

Various means of establishing electric connection between the carriages of railway trains. Metallic tape reels have their cases fixed to the ends of the carriages, and in metallic connection with the circuit wires; a coiled spring keeps a permanent tension on the points of contact. These points of contact consist of a pin with a loose cross-piece, which is slipped within a tube socket; or a "nib" or button, which enters a hole; or helical springs, with spring snap; or binding screws, or union joints with resilient appliances. Another form of connection consists of a metal rod with collars at one end, which drop into a metal groove on one carriage, the rod sliding in another groove on the other carriage; a spring clasping-piece presses on the rod. In another method "auxillary" metal buffers are used. The ordinary buffers with metal faces may also be used.

Alarum or signal apparatus. The engine gives constant motion to a lever, which, as soon as an electro-magnet is excited, works

an alarum or signal. The bell or sounding apparatus consists of a centrifugal bell hammer, which carries a weight free to slide on the arm; the hammer revolves by means of a coiled spring when released by the passage of the electric current.

Method of communicating between the guard and engine-driver. By means of two lines of communication, two galvanic batteries, and two alarums, the passengers are enabled to signal the guard at the same time as the guard signals the driver.

Giving notice of the approach of a train to a station. The electric circuit is completed by a lever acted upon by the train.

[Printed, 4½d.]

A.D. 1853, February 8.—N° 338.

ALLAN, THOMAS.—"Improvements in protecting telegraph "wires."

This invention consists of the protecting of insulated electric telegraph wires, "by means of iron wires so formed into a "rope around a central iron wire core, as to leave spaces between "the spiral" [helical?] "twists of such wires round the core for "the reception of the insulated telegraph wires with or without "smaller wires, or bands of metal exterior thereto."

In the Provisional Specification it is also set forth as follows:— "Another mode consists in forming the longitudinal wires into "links, of a yard long or thereabouts, which are to be linked to a "pair of semicircular cross pieces of iron, between which a "hempen rope containing the insulated conductors is made to "pass."

[Printed, 4½d.]

A.D. 1853, February 8.—N° 339.

ALLAN, THOMAS.—"Improvements in galvanic batteries."

In a battery of silver and zinc, "the zinc plate is placed in a "grooved frame of gutta percha or other suitable material;" mercury is placed in the groove, by which means the plate is always re-amalgamating itself.

The silver plate is bent round the zinc plate sideways, opposing both of its sides; thus permitting an easy evolution of the gases.

"Similar arrangements may be applied to other batteries."

[Printed, 2½d.]

A.D. 1853, February 16.—N° 401.

CUTLER, JOB.—" Improvements in the manufacture of spoons " and forks, and other similar articles for domestic use," which may be coated with " tin or zinc or other metal" "by precipitation " by the aid of a battery or electric machine," or they may be electro-plated.

In manufacturing the above-named articles of cast iron, iron " blanks" are formed either by casting from impressions of original dies, or they are cast without a device, annealed, cleaned, and stamped. They are then annealed in a muffle with "char- " coal, coke dust, and Cumberland ore," pickled, washed, dried, stamped or planished in another die, filed, smoothed, and (if spoons) bowled and set. They are then coated with one or more metals either by dipping in melted metal (which is preferred), or " by pre- " cipitation by the aid of a battery or electric machine." If required to remain a tinned article only, it is finished by re-stamping, burnishing, and (if necessary) "boiling."

" Wrought iron articles of this kind for coating with metals," may be made by cutting a rolled piece of sheet iron into strips, which are again " cross rolled" to form the bowl (if for spoons). The strip or blank is then cut out, by means of a press, to the required shape, annealed, pickled, scoured, cleansed, washed, dried, stamped, and coated with metal or electro-plated.

Articles of German silver may be cast in moulds from patterns as above described.

The Complete Specification also states as follows:—

Iron spoons may also be enamelled or glazed over as other articles of domestic use are glazed.

A method is described in this Specification of "setting or " bending" spoons, forks, &c., by means of suitable dies.

[Printed, 6½d.]

A.D. 1853, February 16.—N° 405.

DAY, JOHN.—(*Provisional Protection only.*) " Improvements " in apparatus for holding and protecting insulated telegraphic " wires."

The insulated wire is placed in a rolled trough of thin wrought iron of a "semi-circular" or any other shape. Another similar shaped trough is placed over the under trough, and "forms a

"tube or cover." The top and bottom parts are kept together by rings slipped over them at convenient distances, or they may be tied together with wires.

[Printed, 2½d.]

A.D. 1853, February 23.—N° 458.

PLANT, Reuben.—"Improvements in safety lamps."

Instead of employing "the wire gauze in the dark state," which "materially interferes in transmitting the light," it is coated "with silver, tin, or other white metal" "by electrotype."

The Complete Specification sets forth a safety lamp of the ordinary construction with the above improvement, and with a glass chimney contracted just above the centre of the flame, and "spread out at its upper end so as to fit within the cylinder of "wire gauze."

[Printed, 4½d.]

A.D. 1853, March 1.—N° 515.

BOLTON, Robert Lewin.—"A new mode of obtaining and "using power by explosion of gases."

Two or more gases are introduced into a cylinder or other receptacle, and, after the valves are closed, exploded; thus an expansive force is first generated, which is immediately followed by a reacting force from the vacuum or partial vacuum created in the cylinder. It is preferred to explode the gases by means of "a spark or sparks of electricity or galvanism." If hydrogen is used in conjunction with air the explosive power only is used; but if oxygen and hydrogen (supplied in the proportions forming water) are used, the acting and reacting forces are both available.

[Printed, 3½d.]

A.D. 1853, March 7.—N° 565.

MAPPLE, Henry.—(*Provisional Protection only.*) "Certain "improvements in electric telegraphs, and apparatus connected "therewith," consisting of:—

1st. "Using a thread or threads of silk, or some similar material, "in lieu of pivots, for the support of the shaft which carries the "magnet and pointer now ordinarily in use in electric telegraph "needle instruments, such thread or threads to be kept strained "sufficiently tight to support the said magnet and pointer in either

" a horizontal or other position, by means of a spring or weight " acting to keep the said thread or threads strained, the object of " such arrangement being to lessen the friction, and to prevent " vibration in the needle."

2nd. "An improved plan for removing the stop of an electric " telegraph alarum, or other apparatus, (the train of which requires " to be released and set in motion by the action of electricity,) by " using the attraction of a permanent magnet or sucking coil for " that purpose."

A "sucking coil" (or hollow electro-magnetic coil), by attracting the magnetic arm of a lever, brings the opposite arm within the sphere of attraction of a second "sucking coil" or electro-magnet; and in moving towards it, a pin on the lever arm releases a bent detent lever by pressing against its inclined end.

[Printed, 4½d.]

A.D. 1853, March 7.—N° 570.

WATSON, JOSEPH JOHN WILLIAM.—" Improvements in illu- " minating apparatus, and in the production of light."

A lamp is described and shown, in which the mixed gases from the decomposition of water (by galvanic agency) are caused to impinge against an incombustible body, and then are ignited.

A close vessel in the base of the lamp contains dilute acid and platinum decomposing plates, and carries a platinum jet or nozzle, directed against a cylinder of spongy platinum or other suitable incombustible substance. Motion is given to the incombustible cylinder (by means of a clockwork train) round its axis, and ascending and descending; this latter motion is given by a groove in the form of a right and left handed screw, cut on the cylindrical support, into which a fixed pin works. A propelling motion towards the gas jet is also given to the incombustible cylinder, by the screwed cylinder (each time it descends) actuating a lever and catch working into a ratchet.

When the lamp is charged with dilute acid by means of a " fountain reservoir," and the electric current allowed to decompose the water so as to produce a considerable pressure of gas in the vessel, the gas is allowed to impinge on the incombustible cylinder; on igniting the gas (or united gases), the cylinder becomes incandescent and gives a brilliant light.

The following points are also observable :—

The "radiating medium" is preferred to be made of a mixture of lime, graphite, and pipe clay.

The light from the radiating body may be increased "by sur- " rounding it with a coil of fine platina wire."

If the incombustible cylinders are composed of spongy platinum, steeped "in nitrate of strontian or other substances used for pyro- " technic displays," colored light may be produced.

To arrest further production of the gases when the water is too low in the gas-generating chamber, a metallic float makes connection between the decomposing plates.

To generate the mixed gases for this lamp, it is preferred to use the "chromatic battery" (See N° 595, 1852).

In the Provisional Specification the following statements are made :—

A galvanic or electric current may be used to render the coil of fine platinum wire surrounding the radiating cylinder incandescent. The same current may also be used to generate the gases.

"An electric light, by whatever means produced," may be combined "with an ordinary source of illumination, in the same " burner."

[Printed, 5½*d*.]

A.D. 1853, March 7.—N° 575.

CAROSIO, Augustino.—"A hydro-dynamic battery, or new or " improved electro-magnetic apparatus, which, with its products, " are applicable to the production of motive power, of light, and " of heat."

This invention "consists in apparatus or machinery for decom- " posing water or other suitable liquid by means of electricity, " obtained from an electrical apparatus constructed on the prin- " ciple of that known as 'Grove's gas battery,' or of a battery " similar thereto, and in employing separately the gases so " obtained for the production of motive power by their elastic " force, and afterwards in recombining such gases in the gas " battery to form the liquid from which such gases were originally " produced; and in which recombination a current of electricity " is generated for decomposing the water or other liquid em- " ployed."

In a "paper" in explanation of the Provisional Specification, the battery is called the "combinator;" the cells for the decompo-

sition of water, the "regenerator;" and a "multiplier" is described, which receives the gases, regulates and equalizes their pressure, and transmits them to separate piston and cylinder engines to produce motive power.

A "lucifer combinator" or battery is described, in which an electric current is obtained from the combustion of the gases.

"In order to supply any deficiency in the quantity of gas," "a magneto-electrical machine, driven by the engines, may be "applied to decompose water," "and thus obtain a supply of the "required gases."

[Printed, 1s. 2½d.]

A.D. 1853, March 12.—N° 631.

MURDOCH, James (*a communication*).—"An improved con-"struction of portable voltaic batteries."

This invention refers to "'chain batteries,'" and consists "in "forming each link of two bent strips of dissimilar metals, say "copper and zinc, applied to opposite sides of a cylinder, or a "quadrilateral piece of soft wood or other suitable porous ma-"terial, and the bent portion of the metals projecting at opposite "ends of the porous material sufficiently to allow the copper "strip of one link to pass through the zinc strip of the next link, "so as to connect one link with another without any intermediate "connection, as rings, hinges, &c." The metallic strips are attached to the porous material "by pinning." In one instance the edges of the strips are serrated.

The Drawing left with the Provisional Specification shows a ring apparently attached to the bent portion of the strips, and forming part of the link of the chain.

[Printed, 6½d.]

A.D. 1853, March 14.—N° 634.

STAITE, William Edwards.—This invention relates to the following improvements in electric light apparatus and galvanic batteries.

An electric lamp is described and shown, with the electrodes vertical, in which "a spirit or water float" is substituted for "the "over-balance weight," to elevate the lower electrode; as the lower electrode is consumed the float rises, thus keeping the

distance between the electrodes proportioned to the battery power when used in connection with "the electro-magnetic regulator." Instead of the ratchet and click used in former lamps (in connection with the electro-magnet) to raise the lower electrode holder, it is preferred to use a friction clip. A cylinder of glass with a ventilating top plate is used, in lieu of the closed glass shade hitherto employed.

Another lamp with the electrodes horizontal. The moveable electrode is actuated by means of cords passing over pullies connected to an electro-magnet by a friction clip, and to weights, one of which moves in a tube of oil. To permit the cord to act on the electrode, the tubular electrode holder is slotted, and an eye is moveable through the same.

Carbon is prepared for electrical purposes by boiling in oil or fatty substances and baking.

Carbon battery plates are connected to metallic conductors by casting, round the tops of the plates, a "jacket of lead slightly "alloyed with tin." The carbon plates are perforated with holes previous to the casting, so that the metal may run therein.

Using platinum wire gauze, with a "jacket" (as described for the carbon plates), for negative battery plates.

A galvanic cell. A tube is attached to the bottom of any ordinary shaped cell, or made in one piece with it; a number of these cells are fixed, side by side, in a frame, so that they can be let down or raised simultaneously; an outer vessel contains the battery fluid, and when the cells are let down so that the flat ends of the tubes rest on a sheet of vulcanized India-rubber at the bottom of the outer vessel, each cell is insulated. A ready means of charging and discharging the battery cells is thus afforded.

"Lead alloyed with other metals more positive than lead," is used as the positive element in galvanic batteries. Antimony, zinc, or tin may be used with the lead, and the exciting solution preferred is nitric acid. The products obtained by electric action in conjunction with that of chemical re-agents are:—Nitrate of lead; carbonate of lead and oxide of tin, yielding yellow pigments by treatment with chromate of potash; and nitrate of potash or soda. These precipitates are cleansed from their acid solutions by washing in sieves with platinum wove wire gauze bottoms, lined with cloth.

A "tell-tale," to warn the light-keeper of an electric light-

house of the condition of the light. This may either be attached to the dial-faced galvanometer formerly patented by the Patentee, or used in conjunction with the electro-magnet in the lamp. A friction wheel and rod are attached to the electro-magnet, rising and falling with the electrodes, and as long as the intermission and completion of the circuit is properly kept up, no other indication is made than the ringing of a small bell (by the release of its detent) every time the intermission takes place; but as soon as the power of the galvanic current diminishes or ceases, the friction roller liberates the clockwork of a large bell as well as that of the small one.

The following Old Law Specifications are referred to:—N^os 11,783, 12,212, and 12,772.

[Printed, 9½d.]

A.D. 1853, March 16.—N° 653.

FANSHAWE, Henry Richardson.—Employing a fine platinum wire, heated by galvanic electricity, "as a means of ignition "to the powder" "in fire-arms in place of the present percus- "sion cap, flint, or match."

The single-cell galvanic battery is placed in the stock of the gun, which is hollowed out for that purpose. The battery preferred is composed of platinized silver, amalgamated zinc, and dilute sulphuric acid. In field-pieces and pieces of ordnance, a convenient receptacle is provided for the battery in the carriage.

Instead of a lock, a "firing tube or needle" is used. This proceeds through an aperture in the end of the breech of the barrel, and has a flange to enable the trigger to force it into the charge or cartridge, and bring its projecting wire into connection with the battery pole. Various modifications of the "firing tube or "needle" are set forth; when the platinum wire is fixed in the cartridge, a needle (insulated from the gun barrel) is used to complete the circuit; when the firing tube carries the platinum wire, it consists of a wire proceeding through a tube, but insulated from it. A helical spring keeps the firing tube against the trigger arm, and prevents battery connection being made, except when firing the piece.

The barrel of the gun is in all cases connected to one battery pole.

It is preferred to use this invention with breech-loading guns.

[Printed, 10½d.]

A.D. 1853, March 18.—N° 665.

CAMERON, PAUL.—"Improvements in marine and surveying "compasses."

In the compass described and shown, the following "improved "arrangements" are made:—

To compensate for the vibrating motion of the compass card, a ball of lead or iron is attached by means of a short brass rod and "ball or universal joint," to the bottom of the compass box.

In connection with this compass a fixed card may be used, having a needle suspended over it. One half of the compass card is divided into a series of triangles, and the edge of the needle is suitably graduated, "so that as the needle works round over the "triangles, the mariner may at once see his course by comparing "the difference between his latitude at any given time and that of "his original point of departure with the actual distance which "his ship has run: similarly the surveyor ashore can thus easily "ascertain the distance between two points."

"The mariner's compass needle" "is suspended from its centre "in the ordinary manner." A small vertical stile is fixed to it over its centre of motion; by comparing the position of its shadow with certain "dial tables," the variation and deviation of the compass is at once ascertained. "If the sun or stars are not visible, "the variation and deviation may be found by placing an artificial "light on the azimuth ring," "to correspond with the arrange- "ment of the tables."

The azimuth circle of this compass is exterior to the gimbal rings, and supports them. It has a screw thread cut round it, into which a fixed tangent screw works. By this means the azimuth of objects is ascertained. To the north and south poles of the azimuth circle are attached studs for holding a telescope or graduated "telescopic quadrant" and "base;" also a vertical graduated brass rod, sliding on the graduated base, and spirit level aid in taking altitudes and distances.

A slip of glass graduated "into degrees of the tangent" is able to be attached by its brass frame to the south pole of the ring; thus the altitude is given upon the glass instead of upon the "quadrant," when a telescope on the other pole is adjusted to the object.

To rectify the copper correcting ring for the oscillations, a solid ring is first taken, and fine copper wire wound on it "until its "density is sufficient for the purpose."

[Printed, 6½d.]

A.D. 1853, March 22.—N° 700.

JOHNSON, John Henry. — (*Provisional Protection only.*)
" Improvements in the mode of smelting iron and other ores."

"This invention consists in the smelting of metallic ores, particu-
" larly iron ore, which have been previously mixed with charcoal
" by the application of the electric light to that purpose. This is
" effected by dropping the ore or metal to be melted between the
" poles of two large electrodes, which are connected in the ordi-
" nary manner with a galvanic battery. The electric light thus
" produced melts ore as it passes through it, and the melted
" metal with the slag falls into a receiver below, where it is kept
" in a state of fusion by a suitable furnace placed beneath it, the
" different specific gravities of the 'slag' and melted metal keeping
" them separate in the receiver. By another arrangement the two
" electrodes are placed at a slight angle, and the higher one of the
" two is made hollow and filled with the ore to be reduced. This
" ore is gradually pushed forward as it melts by a piston and screw
" rod working within the hollow of the electrode. When the
" whole has been reduced the piston is withdrawn and the elec-
" trode filled again. As the electrodes are consumed, they are
" caused to advance by screw spindles working in fixed nuts, and
" attached to armatures or sockets on the ends of the electrodes,
" or by the apparatus a continuous supply of electrodes may be
" attained in various other ways."

[Printed 2½d.]

A.D. 1853, April 4.—N° 806.

BURQ, Antoine.—" Certain instruments, apparatus, and articles
" for the application of electro-galvanic and magnetic action for
" medical purposes."

This invention is identically the same as N° 316 (1852), which see.

[Printed, 7½d.]

A.D. 1853, April 12.—N° 881.

KAYE, Robert John, and OPENSHAW, John Ormrod.—
An electro-magnetic engine, in which rotary motion is given to a shaft passing through the centre of a frame on which horseshoe electro-magnets are fixed radially.

The poles of the electro-magnets are arranged in the circumference of a circle, and the line joining the poles of each horseshoe is parallel to the central shaft.

The central shaft carries two discs or wheels, one on each side of the magnet frame, which support armatures parallel to the shaft, the armatures being fixed between them. The armatures are thus free to revolve nearly in contact with the poles of the electro-magnets, the circle of armatures being concentric with the circle of magnets.

In order to give motion to the armatures, and thence to the central shaft, a certain number of magnets are magnetized in advance of the armatures; various commutators for effecting this object are described. In one instance, springs (one to each armature) move over a fixed inlaid disc. In a second instance, permanent magnets take the place of the springs, and attract spring armatures that make the requisite electrical connection. In a third instance, fixed metallic springs press on a revolving metallic ring, except when taken out of contact from it by suitably placed raised surfaces on a wheel. In a fourth instance, fixed "small levers" complete the circuit suitably when pressed by the teeth of a ratchet wheel on the shaft. The two last instances are only mentioned in the Provisional Specification.

Several magnet frames and armature wheels may be mounted on the same shaft, so as to act simultaneously. In this case the galvanic current is continuous through similarly placed magnets in the various frames.

To reverse the engine, the inlaid disc is made slightly moveable, so as to alter the side of the keepers on which the active electro-magnets lie.

The speed of the engine is governed by the ordinary centrifugal governor balls raising or depressing a rod carrying wires that project to various depths, and thus immersing more or less wires in a vessel of mercury that completes the circuit. Each wire completes the circuit of a certain number of battery cells; the speed of the engine is thus kept uniform by admitting more or less battery power to it, according to the work to be done.

[Printed, 7½*d.*]

A.D. 1853, April 14.—N° 906.

DUNCAN, JOHN WALLACE.—The title of this invention is as follows:—"Certain new combinations of gutta percha with other "material, and the method of applying such for use."

The invention principally relates to the preparation of a cement and of a waterproof coating for fibrous materials; but in the Complete Specification a description is given of a "machine for "applying cement for use to unite together wire, gutta percha, "or gum madder, textile fabric, metal strips or bands in concen- "tric layers, suitably interposed to isolate" [insulate?] "and "protect the wires and strip metal, in the form of a round manu- "factured rope, suitable for conducting electricity for telegraph "purposes."

The compound used in this invention consists of gutta percha and various balsams, with or without shellac or other resinous and bituminous substances. To prepare it for use, the various substances are passed through a "masticator;" the masticator consists of a hollow steam-heated cylinder, having an axis working in its centre that carries helically-disposed teeth, whose action is to mix the materials and force them towards the delivery orifice at the same time.

To coat telegraph wire, "secondary masticators" are used. The wire successively enters chambers underneath the cylinder of the machines, from which it receives its various coatings, increasing in diameter as it progresses. The textile fabric, or sheet metal, is introduced into the ingress orifice by means of a "cone-piece" (attached to the orifice), having a segmental mouth and volute aperture, that gradually contracts and curves the material as it approaches the wire, and thus encloses the wire in a helical casing of fibrous or other material.

[Printed, 11½d.]

A.D. 1853, April 19.—N° 944.

FULLER, JOHN.—"Improvements in galvanic batteries."

In a copper and zinc double-fluid battery sulphate of copper solution is used next to the copper, and sulphate of zinc solution next the zinc; by this means the fluids employed do not act on the respective metals "when the circuit is not coupled up."

"Another improvement consists in using plumbago, or coke in a "powdered state, in a porous cell, as the positive" [negative?]

"element of the battery." The elements preferred to be used in this improvement are powdered plumbago or coke, dilute sulphuric acid, and zinc.

[Printed, 2½d.]

A.D. 1853, April 20.—N° 957.

HARRIS, Sir WILLIAM SNOW.—"Improvements in lightning "conductors for ships and vessels."

This invention consists of "constructing lightning conductors "for ships and vessels in such manner as to cause the metal "from the lower mast to pass outside of the ship," "in place of "passing down the lower masts and through the bottom of the "ship or vessel, as was formerly the practice."

Down to the lower mast head the construction is the same as heretofore; but to a plate fixed at the mast head, tubes, that pass down the rigging to "copper plates at the side of the ship," are secured by hooks. To allow for "any lengthening or shrinking "of the rigging," the long tubes slide in short pieces of tubing lashed to the rigging, and are connected thereby. The above copper plates "are fixed at their lower ends to the coppering of the "bottom of the ship or vessel."

[Printed, 5½d.]

A.D. 1853, April 27.—N° 1023.

REID, WILLIAM.—"Improvements in apparatus for testing the "insulation of electric telegraph wires."

"This invention is for testing electric telegraph wires prepared "for submarine and subterraneous telegraphs by exhaustion "and pressure." For this purpose the coil of covered wire is placed in a strong iron vessel, from which the air is exhausted; "the passage for water is then opened in order to fill the vessel," and pressure exerted by force pump or other means. "One end of "the covered wire is conducted from the interior, through a "stuffing box, to the outside of the vessel; the other end of the "wire is to be coated over and well insulated." A galvanometer is then included in a galvanic circuit, with the wire to be tested and the water in the vessel, when any "imperfections in the "covering will instantly be discovered."

[Printed, 2½d.]

A.D. 1853, April 27.—N° 1025.

KINGSTON, John Filmore.—(*Provisional Protection only.*) "Improvements in galvanic or voltaic batteries."

"This invention consists of applying syphons to such batteries "in order to keep up a constant supply of the liquid used, and also "constantly to remove a quantity of the liquid (which has been "acting) from the batteries, and thus to maintain a uniform state "of action."

[Printed, 2½d.]

A.D. 1853, May 2.—N° 1067.

RADUNSKY, Christian (*a communication*).—(*Provisional Protection only.*) "Certain improvements in electro-voltaic apparatus."

This invention refers to chain batteries, and consists in the following particulars:—The links are made flat and thin, by which arrangement a large surface in a small space can be obtained, and the chain is more comfortable to the wearer than other electric chains. The plates are connected together with leather or other porous but strong substance, and are fastened to the leather by metallic pins. The plates of the same link "fit "into each other, and leave an equal space all round their contours." Another construction of electric chain consists in stringing the plates upon a ribbon.

Various configurations of plates, mounted according to the above-described methods, are shown in the Drawings.

[Printed, 5½d.]

A.D. 1853, May 11.—N° 1155.

BRETT, Jacob (*partly a communication*).—"Improvements in "electric telegraph apparatus."

The force of air or gas is applied "to magnetic or electro-"magnetic telegraphs, combined with magnetic or electro-magnetic "apparatus escapements, for the purpose of giving more energy "or force to the movement of the escapements, with a view to "the more rapid working of such apparatus."

In applying this invention to the telegraph described in a former Patent (See N° 10,939, Old Law), the pallet lever of the type-

wheel escapement is actuated by the double-headed piston of a small cylinder, to which air is suitably admitted from a reservoir by a collar valve connected with an electro-magnet.

The driving axis of the air pump also carries four pullies, connected by bands with similar pullies on the axes of the type wheel and escapement, of the locking cam, of the excentric or printing cam, and of the composing-machine shaft respectively, thus moving these portions of the telegraphic apparatus when required.

The electro-magnet working the collar valve has a metal tube, on which are a series of ferrules in its centre. The collar valve is on one end of the tube, and is vibrated by the intermittent current. The vibration is caused by the attraction of the ferrules towards fixed discs when the electric current passes, and by the reaction of a peculiarly mounted "tension spring."

The "tension spring" consists of "a fine steel wire stretched "across an elliptical frame, and retained in a state of tension" by adjusting screws. A "hook piece" at the top of the tube is attached to the centre of the tension spring, which thereby keeps the ferrules in a position to be drawn down by the discs.

In another method, an ordinary train of wheels, similar to that described in N° 12,054 (Old Law), are adapted to the air pistons, in place of the above-mentioned air pump and bands and pullies.

"A new mode of arresting and releasing the printing part of the "train by means of an electro-magnet" is as follows:—When the electro-magnet is included in the circuit, by means of a ratchet wheel or circuit cam, it attracts a keeper fixed to the locking arm of the locking cam, and releases the printing train.

Another arrangement is described and shown, in which the tension spring is applied to an electro-magnet for working the type-wheel escapement. The pallet works into two escapement wheels, and is on the axis of a lever that locks into a ferrule on the vibrating armature rod.

[Printed, 1*s*. 10½*d*.]

A.D. 1853, May 11.—N° 1164.

BRADBURY, William, and EVANS, Frederick Mullet (*a communication*).—"Improvements in taking impressions and "producing printing surfaces."

"This invention consists of placing plants and other vegetable

" matters, insects, and other substances between a surface of steel " and a surface of polished lead, and by pressure obtaining an " impression on the lead, and from such impression obtaining " an electrotype surface suitable for printing."

The electrotype plate obtained direct from the lead is used to obtain a second electrotype plate, which is used as a printing surface. The solution preferred, in both these cases to deposit the copper from, is one of sulphate of copper.

[Printed, 2½d.]

A.D. 1853, May 20.—N° 1248.

SCHOLLICK, Edward Jones.—" Improvements in obtaining " motive power."

"This invention consists of a combination of apparatus which " decomposes water by electric currents into its component " gases, as is well understood; such gases are caused to be " passed into a cylinder within which a piston works, and then " by a second electric apparatus electric currents cause the gases " to bé exploded, and thus is motion given to the piston in " one direction; when, the valves and apparatus being reversed in " their action, the gases are admitted to the other side of the " piston and there exploded, by which the piston is moved in the " opposite direction."

The pistons, cylinders, and valves employed are similar to those of a steam engine, and are surrounded by the gas generating vessel. The exploding of the gas in the cylinder, after the valves have cut off the supply thereto, is caused by the movement of the piston connecting the poles of the exploding battery; the explosion of the gas is "followed by vacuity on that side of the piston or " pistons" at which the exploison has taken place "at the time " the valve or valves will be opened to admit gas to the other side " of the piston or pistons." "A tube from the end of each " cylinder has a valve opening outwards," by which the water resulting from the explosion "will be driven back to the vessel " where the water is decomposed." A partition of wire gauze, in the passage leading from the vessel to the cylinder valves, prevents explosions in the generating vessel.

[Printed, 2½d.]

A.D. 1853, May 25.—N° 1281.

BAUER, William.—(*Provisional Protection only.*) "Improve- " ments in the construction of vessels to be used chiefly at

" various depths under the surface of water, and in machinery " or apparatus connected therewith for propelling balancing, " and steering the same, and for carrying on operations of various " kinds on or under the surface of the water, from within, upon " objects without such vessels," which improvements are applicable " *for laying submarine*" [*electric?*] " *telegraphic wires.*"

To effect lateral motion, a screw propeller and rudder are employed; vertical motion is effected by ballast and water received into or discharged from the boat; fins, placed at any required angle with the horizon, guide the vertical motions. "A weight " adjustable in a longitudinal direction serves to depress the boat " either by the bow or stern."

For the convenience of persons inside the boat, it is provided with windows and "flexible water-tight sleeves." Fresh air is drawn from above the surface of the water and the foul air driven out by double-acting air pumps in connection with tubes.

The motive power is generated by means of gas from the ignition of a mixture of nitre, sulphur, charcoal, and ammonia, which does not consume any air; a piston similar to that of a steam engine, in connection with the propeller, is worked by this means.

This vessel or boat is called "an 'hyponaut apparatus.'"

[Printed, 2½*d*.]

A.D. 1853, May 28.—N° 1312.

SMITH, WILLIAM.—"Certain improvements in the machinery " for and method of making and laying down submarine and other " telegraph cables, which machinery is also applicable and is " claimed for the making of ropes and cables generally."

The usual plan is to place the reels (carrying the protecting wire to be wound round the insulated core) "around a circle or common " centre," the centre of each reel revolving round, and being excentric to, the common centre of motion of the machine. This invention, however, consists in placing the reels behind each other, and causing them to revolve on the centre of motion of the machine, which is coincident with their own centres.

The wires composing the insulated core may either be mounted as the protecting wires are, or proceed through the centre of the reels and frames, made hollow for that purpose.

Each reel is mounted separately, and has motion communicated to it by spur gearing (modified by friction straps).

Frames are placed between each successive reel, which support (by friction rollers) "bearing wheels," attached to spur wheels, and having bearings for the reel spindles.

The wire proceeds from each reel, over a pulley, and through suitably placed holes in the bearing wheels in front of the reel in question, till it arrives at the first bearing frame, from which all the wires are converged to a "perforated cone" or "laying plate," whose axis is coincident with that of the reels. From the laying plate it proceeds (in the same straight line with the reel axis) to the "nipper," which "receives the united strands or covered cable "and corrects any irregularities therein." It then passes round "taking off rollers," over a bearing pulley, to the coil of finished wire.

For the purpose of testing the insulation of the wire during its manufacture, the shaft of the drum carrying the insulated wire of the core has several insulated metal rings, with one of which the end of each insulated wire is in metallic connection. Springs pressing against the rings are connected with signal apparatus.

It is proposed to apply the above-described arrangement "in "the hull of a ship," so as to manufacture and submerge sub-"marine and trans-oceanic telegraph cables" "simultaneously or "otherwise."

[Printed, 11½d.]

A.D. 1853, June 2.—N° 1350.

WHITWORTH, Joseph.—"Improvements in machinery for "perforating or punching paper, card, and other materials."

This invention is "applicable to perforating the paper used in "communicating intelligence by electric telegraph" (See N° 11,480, Old Law).

A machine is described and shown, in which, by depressing one or more of a number of finger keys, a hole is punched in any required position through a strip of paper; the paper is also moved forward (by the same action) the requisite distance to receive a fresh perforation.

To perforate the paper, reciprocating motion is communicated from a constantly rotating shaft to a series of punch levers, an excentric part of the shaft being connected with the levers by means of toggle joints. When a key is depressed, levers in connection with it straighten the toggle joint belonging to the

corresponding punch lever, and bring the plane of its action sufficiently low to perforate the paper in a die beneath.

The paper is passed between rollers on each side of the die; and is traversed by means of a clockwork mechanism, actuated by a weight, whenever a pallet lever is depressed and raised by the corresponding movement of the finger key. The power is communicated from the driving barrel to the lower pair of rollers on which the paper rests, by means of an escapement wheel, and ratchet, spur, and bevil gear.

Similar machinery may be "used for perforating the cards of "jacquard engines."

[Printed, 10½d.]

A.D. 1853, June 25.—N° 1551.

SANDOZ, Alfred (*a communication from Philipe Henri Matthey Doret*).—"A solar watch."

This invention "consists in combining a compass with a "fixed ring or dial marked with the hours of the day, from "4 a.m. to 8 p.m. inclusive, and with an upright split rod "fixed to the dial opposite the north point on the compass, "in which a piece of silk, stretched from the opposite part of "the dial, is capable of being adjusted according to the quarter "of the globe in which the instrument is used. The silk being "adjusted, the instrument must be held perfectly horizontal; the "needle must point due north, and be exposed to the sun's rays, "when the shadow from the silk cord will be cast upon a figure "or between two figures upon the dial, which will give the hour "of the day."

This instrument "may be applied to any portable object;" the Specification and Drawings show it applied to a walking stick; "in order to ensure the instrument being held in a horizontal "position," a rod is passed "through an aperture in the stick and "through a piece of metal pipe," "previously sunk in the body of "the stick. By applying a finger and thumb to the ends of the "rod," "the stick will be balanced, and the dial will be held in a "horizontal position."

[Printed, 6½d.]

A.D. 1853, June 28.—N° 1562.

BELLFORD, Auguste Edouard Loradoux (*a communication*).—"Improvements in magneto-electric machines."

A magneto-electric machine is described and shown, having the following peculiarities :—

"Several currents are developed at the same time whose "changes of direction take place at successive intervals, so "that only one is broken at a time;" also the "current dis-"charger" (analogous to the "pole changer" of ordinary magneto-electric machines) changes the poles exactly when the centres of the helices arrive opposite the centres of the poles of the permanent magnets; by this arrangement the resulting electric current is continuous, and the helices need not revolve rapidly to produce an effective result.

The machine consists of a vertical spindle carrying a wooden wheel, to the circumference of which the helices are fixed, their axes being parallel to that of the spindle. Horseshoe permanent magnets are fixed to the frame carrying the spindle, so that the helices may revolve between their pole faces. The legs of the permanent magnets are parallel to the centre spindle, round which they are fixed, with the line joining the opposite poles of each horseshoe radiating from the centre. The wheel carries a double row of helices, one between the external poles of the permanent magnets, the other between the internal poles; and the helices in each row are so arranged that no two helices are opposite the poles of the same magnet at the same time.

To carry out the principle of construction of the machine properly, the number of permanent magnets in one circle should be four, or any multiple of four, so as to always bring two north poles opposite each other, and two south poles opposite each other; the poles should be so arranged that in the circumference of the circle there may be a north and south pole alternately.

It is preferred to connect the coil terminals to the "current "discharger" in three or more series, each series forming a "minor current discharger," and comprising two circles of inlaid plates.

The current discharger itself consists of inlaid metal plates in a non-conducting portion of the spindle, that make electric connection with springs fixed to polar binding screws. In the case of three series there are six circles of inlaid plates, three springs in connection with one binding screw, and three springs with the other binding screw. Each minor current discharger is arranged with every succeeding plate oppositely connected with the magnet

coils, in the usual manner to produce a current in one direction from an alternating current; to effect this, the plates may either be connected across at the back, or they may consist of strips from bands intervening alternately in the circle of contact of the springs. The peculiarity of the current discharger in this machine is, that instead of the breaks of the minor dischargers being in a line parallel to the spindle axis, they are disposed helically round the cylinder, thus breaking only one of the series of currents at a time.

[Printed, 10½*d.*]

A.D. 1853, June 28.—N° 1563.

JOHNSON, JOHN HENRY (*a communication from Claude Desbeaux*).—" Improvements in turning over the leaves of books, " music, and engravings, and in the apparatus for effecting the " same."

A rectangular box is attached to the music-stand, piano, &c., which carries the axis of a vibrating arm, and contains the requisite cords, springs, &c. When the performer places his foot on a pedal (from which cords proceed, by means of pullies, to the axis), a magnet on the extremity of the vibrating arm comes into contact with an iron or steel disc or clip on the leaf; and when the pedal is released, springs in the box bring the " magnet-carrying arm " to its quiescent position, thereby turning over the leaf; the axis of the arm being placed nearer to the left side than the centre of the book, enables the magnet to slide off the disc. The springs in the box to return the arm are helical, and are attached at their free extremities to cords passing round a pulley on the axis; when the axis is partially rotated by pressure on the pedal, one of the springs is elongated, therefore the release of the pedal causes its contraction and the restoration of the vibrating arm to its original position. To allow of the arm being lengthened or shortened to suit the size of the music-book, it is made telescopic; the inside tube being connected by a cord, passing over a small internal pulley in the main pulley, to the helical springs; the adjustment of the arm to a large book increases the tension of the springs sufficiently to enable them to act efficiently against the extra leverage thus opposed to their action. A small catch fitted to the arm prevents the newly turned leaf from returning.

[Printed, 6½*d.*]

A.D. 1853, June 30.—N° 1577.

WEBB, Joseph.—(*Provisional Protection only.*) "Improvements " in obtaining and applying motive power."

"This invention consists in the use and application of gas" [common coal gas?] "in combination with electricity, for the purpose " of exploding said gas within the cylinder of a steam engine, and " thereby to create an elastic force or power."

"In applying this invention to a rotary engine," "the axis " of the piston is formed hollow, as also the main driving " shaft." A pipe is placed within such hollow parts, "one " end of which is in connection with a reservoir of gas," air is also admitted by this means; the other end of the pipe " terminates in the middle of each piston, in which an opening " is formed for establishing a communication between the " inside of the cylinder and the inside of the axis of the piston, " in which there is also placed a wire of" [or?] "wires, which " are in connection with a battery, for the purpose of passing " a spark along one or other of said wires for exploding the " gas when it arrives at the opening which communicates with " the inside of the cylinder;" certain mechanism alternately opens and closes one of such openings, to move the piston and to reverse the direction of such motion. Thus, by admitting and exploding the gas, a succession of impulses and rotary motion will be imparted to the pistons and parts in connection therewith.

[Printed, 2½d.]

A.D. 1853, July 1.—N° 1587.

SHEPARD, Edward Clarence (*a communication*).—"Im- " provements in magneto-electric apparatus, suitable for the pro- " duction of motive power, of heat, and of light."

"This invention has for its object improvements in the " apparatus" described in the Specification of N° 14,197 (Old Law), and its principal feature is a peculiar method "of coupling " up or combining the metallic circuits of the several series of " coils."

A magneto-electric machine is described and shown, in which the horseshoe permanent magnets are fixed in separate planes or series; each series have their poles in the circumference of a circle,

to which the line joining the poles of each magnet forms a tangent, the legs of the magnets being nearly radial and pointing inwards. The adjacent polarities in each series are of opposite names, and the series are arranged so as to have opposite polarities in the same straight line. A shaft revolves in the centre line of all the series, and carries wheels having coils disposed in bearings on their circumferences, the axes of the coils being parallel to the shaft; in each wheel the coils are thus made to pass between two adjacent series of magnets.

The currents from the coils of this machine are combined and collected as follows:—The coils of each wheel are divided into series, and one of the terminal wires of each series is connected to an insulated radiating arm on the shaft; there are twice as many radiating arms as there are coils in each series. The arms being separately connected to insulated rings on the shaft, and copper wires bearing against these, afford the means of using the currents. The arrangements for each of the wheels is the same, and there is no making and breaking the contact.

[Printed, 1*s.* 10½*d.*]

A.D. 1853, July 2.—N° 1591.

SHEPARD, Edward Clarence (*a communication*). — " Im-" provements in the manufacture of gas."

This invention relates to manufacturing gas by decomposing water " by currents of electricity." For this purpose the water is combined with pure concentrated sulphuric acid and pure liquid ammonia; the Provisional Specification also states that " another " mixture may be made with the salts, composed of acids and of " alkaline or earthy bases with liquid ammonia, to form solutions " having variable densities with their nature, and which is placed " in the apparatus for decomposition." (See N° 16, 1853.)

The magneto-electric machine described in N° 1587 (1853) is preferred to be used in the production of electric currents for this invention.

[Printed, 2½*d.*]

A.D. 1853, July 2.—N° 1593.

BROOMAN, Richard Archibald (*a communication from — Depoully*).—" Improvements in impregnating, saturating, or " covering yarns, threads, and fabrics with metals."

The process employed is called "metallic dyeing," and is as follows:—

The cleansed yarns, &c., are immersed in a solution of a metallic salt, then submitted to the action of a "deoxydizing" agent, so as to reduce the metal; they are then coated with a thicker coating of metal (if necessary) by simple immersion or by a galvanic current.

This process is carried out in the following manner:—

To free the yarns, &c., from fatty or other objectionable matters they are "introduced into a warm caustic alkaline bath," washed, rinsed, dried, and passed through the rectified alcohol.

The spirit is then expressed from the yarns, &c., and they are saturated with a solution of a metallic salt; ammoniacal solutions are preferred.

The yarns, &c., are then exposed to a current of "deoxydizing "or reducing gas," to reduce the metal of the metallic salt to a reguline state; phosphuretted hydrogen is preferred.

In some cases a further deposit of metal may be made by chemical affinity, in others by means of a galvanic battery in connection with a suitable depositing solution; for copper, a solution of carbonate of copper and cyanide of potassium may be employed.

The Drawings show the following apparatus for the above processes:—

An apparatus to subject skeins of yarns to the action of the "deoxydizing" gas, consisting of gas generating and cleansing vessels, gasholder, and chambers for holding the skeins, having perforated openings to admit the gas, and passages to convey it away.

An apparatus in which the matters to be treated have the gas forced or drawn through them. A pump and cylinder holding the compressed substances are shown; "the gas may be collected in "a second holder or gasometer, so as to prevent waste."

An apparatus for treating the skeins with gas, in which they are introduced through tubes.

Fabrics may either be stretched on rollers or "hung upon a "frame arranged spirally," in order to be subjected to the action of the gas.

A vat for electro-depositing metal on skeins, in which they rest on metal rods; by this means their position is able to be altered from time to time.

Another electro-depositing vat, in which the skeins are placed on rollers; to one of the rollers rotary motion is given.

An apparatus for electro-depositing on fabrics of a considerable length, in which the fabric is rolled from one cylinder to another.

"An apparatus suitable for impregnating, saturating or covering "yarns," &c., by immersion. The skeins, suspended on a frame, are immersed in the solution contained in a gilt copper steam-heated boiler.

[Printed, 7½d.]

A.D. 1853, July 9.—N° 1641.

TOURNIÈRE, Pierre Auguste, and DE MECKENHEIM, Louis Nicolas.—"Improvements in the manufacture of soap "and washing paste, and of the materials used therein," consisting of:—

1st. "The employment of a concentrated solution of caustic "alkali of a sufficient density to effect the neutralization and "saponification of oils and fatty bodies."

2nd. "The employment of new materials for the manufacture "of soap."

3rd. The manufacture of washing "paste."

4th. "The manufacture of crystal of soda" and "certain pro- "cesses for the employment of common salt and sea water."

The process employed is as follows:—

A saturated solution of common salt or of sea water is kept boiling for some time; "the decomposition of the water is next "effected, either by adding to the solution a mixture of sulphuric "acid and iron filings or pieces of zinc, or by the voltaic pile." During the process a current of hydrogen or carbonic oxide may be passed through the solution; and the operation is continued for some hours, the chlorine of the chloride of sodium becoming united "with the hydrogen or with the oxide of carbon," evaporates, "and the soda is precipitated." By continuing the boiling and evaporation "dry crystals are obtained." "In place of "evaporating, the concentration of the caustic lyes may be pro- "ceeded with."

"The decomposition of the water effected by one or other of "the two processes before described is not indispensable, but "shortens the operation to a great extent, and renders it more "perfect."

[Printed, 4½d.]

A.D. 1853, July 13.—N° 1664.

WILLIAMS, WILLIAM.—(*Provisional Protection only.*) "Im-"provements in electric telegraphic instruments."

"This invention consists of a peculiar construction of pointing "electric telegraph instrument; for this purpose a tube, made "partly of soft iron and partly of brass, is coiled round with "insulated wire. Within the tube is an axis having fixed thereto "two bent magnets, the poles of which are reversed. One such "magnet is near one end of the tube, and the other magnet is "near the other end of the tube, and on the axis is fixed a point-"ing hand. By this arrangement according as the electric cur-"rent is caused to pass in one or other direction so will be the "pointing of the pointing hand; or, when pointing in only one "direction is desired, the magnets may be dispensed with, and "soft iron used on the axis in place thereof."

[Printed, 2½d.]

A.D. 1853, July 14.—N° 1671.

CAROSIO, AUGUSTINO.—(*Provisional Protection only.*) "A new "or improved electro-magnetic apparatus, which, with its pro-"ducts, is applicable to the production of motive power."

This apparatus "consists of four separate parts." The first, or "'combinator,' consists of two or more reservoirs, which contain "chlorine gas and hydrogen gas separately;" these two gases are combined "by means of hydrochloric acid," and an electric current is generated "by the aid of platinum or some other sub-"stance which assists the combination of hydrogen and chlorine "gases in forming hydrochloric acid." The second part, or "'regenerator'" "consists of one or more receivers which contain "hydrochloric acid;" the electric current generated in the "'com-"binator'" is introduced into the "'regenerator,'" and the hydrochloric acid is separated into hydrogen and chlorine. These two gases are then conveyed into the third part of the apparatus or "'multiplier'" (which consists of two receivers), where they are condensed. The gases then pass into the fourth part of the apparatus: this "consists of cylinders provided with pistons "nearly similar to those of ordinary steam engines; the pistons

" are set in motion by the elastic force of the hydrogen and " chlorine gases acting separately, and in the same manner as " steam."

" After having set the pistons in motion, the gases (still sepa- " rated from each other) return into their respective reservoirs in " the 'combinator,'" "where they are combined again as before, " and the whole operation repeated."

[Printed, 2½d.]

A.D. 1853, July 15.—N° 1681.

GOWLAND, George.—" Improvements in certain nautical and " surveying instruments."

In a mariners' compass a spherical graduated zone is used instead of a card; it is viewed from the side, and is enclosed in a spherical compass box (hung from an arched bar by gimbal rings), half of which is of brass and half of glass. The magnetic needles are fixed to the card, and may either be straight or curved; the card is supported by a brass bar and agate cup upon a brass bell, resting on a pin fixed to the weighted bottom of the compass box. A curved wire or line marked on the glass serves as a "'lubber's " 'line.'"

In connection with the above-described compass box, a vessel containing spirits of wine may be used; this device stops the vibration of the bell, the lower part of which is immersed in the liquid.

A theodolite is also described and shown, with the above-described spherical compass card attached. In the instrument shown a toothed wheel and pinion, applied to the horizontal and vertical limbs, enable the angular divisions to be read off minutely on an index over which a hand on the pinion axis works.

[Printed, 5½d.]

A.D. 1853, July 18.—N° 1706.

ALEXANDRE, Isaie.—" Improvements in metallic pens and " penholders," consisting of:—

1st. " Communicating magnetism to steel pens" "to diminish " their tendency to corrosion."

2nd. Constructing penholders so that they shall cause "a vol- " taic current to pass through the hand of the writer."

The method shown in the Drawings consists of cutting a double-threaded screw on the wooden penholder, and inserting a copper wire in one thread and a zinc wire in the other thread; other similar methods may be employed.

In using one of these penholders "the voltaic current generated "by the contact of the hand with the metals of the holder destroys "or diminishes the tremulousness of aged persons and invalids, "and gives tone to the nervous system of such persons."

[Printed, 4½d.]

A.D. 1853, July 29.—N° 1777.

NEWTON, William Edward (*a communication*).—"Improve-"ments in depositing metals or alloys of metals."

This invention relates to the solutions used for metallic deposition either by immersion or "by galvanic agency."

To electro-deposit brass the double salts of the metals (copper and zinc) and an alkaline base are used; the following are mentioned, the chloride, acetate, carbonate (with ammonium as a base), and tartrate (with acid "hydrochlorate of ammonia"); also a solution of the citrate of copper and of zinc in citric acid, or of the tartrate of these metals in potash or soda, may be used.

For depositing copper on iron by immersion or by the battery, a solution of acetate of copper in acid "hydrochlorate of ammonia," or of citrate of copper in citric acid, may be used.

For bronzing by galvanic agency, a solution of the double tartrates of the elementary metals (copper and tin) and potash may be used; for an alloy of zinc, tin, and copper, the double cyanide of copper and potassium in combination with zincate of potash and stannate of potash, or the double tartrate of the metals and potash, may be used.

The following solutions may be used for electro-brassing:—A salt of copper in cyanide of potassium in combination with a salt of zinc in ammonia, or the inverse combinatiou.

For electro-bronzing, a solution of salt of copper in cyanide of potassium and of protochloride of tin in potash may be used.

Another part of the invention consists in electro-depositing an alloy of zinc and manganese from a solution containing chloride of sodium, sulphate of zinc, and chloride of manganese; or sulphate of manganese, with "sulphate or hydrochlorate of ammonia" or chloride of potassium, and chloride of zinc, may be used.

This invention also consists "in obtaining great thickness of "coating by depositing successive layers of metals or alloys." The following metals may be successfully applied:—Zinc, lead, tin, nickel, cobalt, copper, palladium, and "platina;" also the following alloys, copper and zinc, copper and tin, zinc and manganese, and copper zinc and tin. The same result may be attained by depositing alternately or successively from different solutions of the same metal or alloy.

Applications of the above-described processes are set forth at length.

[Printed, 3½d.]

A.D. 1853, July 30.—N° 1779.

HENLEY, WILLIAM THOMAS.—"Improvements in modes of "protecting wires for telegraphs."

The object of this invention is to fix the wires securely in troughs without the use of bolts or screws. In one form, the ends of the troughs and covers slide into connecting pieces having notches at each side for the reception of lugs cast on the covers; in this case a lid cannot be removed without cutting off one of the lugs or removing the whole series. In a second form, lugs are cast on one end only of each cover; these enter notches over the plain cover of the next trough in such a manner as to secure it at the same time as the connecting piece is firmly secured to both ends of the covers and troughs placed within it. By using a connecting piece which has its upper edges bent inwards so as to bind the covers, the troughs may be separated at any required part; in this case no lugs are cast on the covers, and the connecting pieces are merely driven beyond the junction when the troughs are to be separated. An arrangement is also described and shown, in which a connecting cover slides over projecting beads on the connecting pieces. The connecting pieces above described may be cast on to the troughs and covers. Troughs and covers may be made in the shape of half pipes, with chamfered edges, or the lids may slide in dovetail grooves. Several forms of troughs and pipes on the above-described plan may be used for curvatures and bends.

"A testing box" may also have its lid secured by projecting beads and grooves.

In many of the above lids, ribs along the top may give them increased strength.

[Printed, 1s. 8½d.]

A.D. 1853, July 30.—N° 1785.

FONTAINEMOREAU, PETER ARMAND le Comte de (*a communication*).—" An improved mode of producing an electric current."

A charcoal and amalgamated zinc double-fluid battery is described and shown, in which the chief points are, the method of insulating the battery and the elements thereof, and " the " arrangements for rendering the battery self-supplying with " acid." The cells (containing porous cells, metals, and exciting fluids) are placed in an outer casing, which is supported on trestles, and communicate with channels running longitudinally underneath the outer casing, the porous cells with one channel (through an opening in the outer cells), and the outer cells with another channel. The porous-cell channel is in connection with a reservoir containing nitric acid, and the outer-cell channel is in connection with a reservoir containing dilute sulphuric acid; these vessels or reservoirs are in a separate frame, and each of them are able to be raised or lowered so as to supply or empty the cells in connection with them. The channels are composed of inverted T pieces, one to each cell, connected so as to form a continuous tube by " vulcanized caoutchouc washers," which are closed by a " pincer " arrangement so as to insulate the cells. A separate electro-magnet and weak battery open and shut " the taps of the two reservoirs." At the top of the trestles are wooden axes, to which the charcoal and zinc plates are suspended by cords; thus, by means of a handle and cog wheels with a " catch," the plates can be raised out of the solution.

Another arrangement is also described and shown, by which the porous and outer vessels may be raised with the metals in them, with a suitable arrangement of pipes; the fluids then subside from the plates to the level of the fluids in the reservoirs.

[Printed, 10½*d*.]

A.D. 1853, August 1.—N° 1788.

SMEETON, JOHN.—" Improvements in the manufacture of " tablets and dial plates, applicable to shewing the distances " of carriages travelling, barometers, *compasses*, and time-pieces."

The nature of the invention, and the manner in which it is performed, is as follows :—

1st. " By forming a blank or ring of metal the required shape; " then by drawing the same through a set of steel or any metal

" tools known as drawing through tools; this process forms a " a curve or rim on the edge."

2nd. " By placing a printed satin, parchment, paper," " silk, " leather, geledine" [gelatine?], " or any elastic fabric, over the " metal plate; a die and press is then applied to the same, and " both become united."

3rd. " Eylet holes of metal, ivory, pearl, or bone are then inserted, " to admit of the centre pinion for the hands to work upon, and " to receive the key for winding; this having been done, completes " the tablet and dial plate."

[Printed, 2½d.]

A.D. 1853, August 1.—N° 1789.

DE MEDEIROS, John Carvalho (*a communication*).—" Im-" provements in the means or processes for preserving metals " from corrosion."

This invention " consists in applying mercury or quicksilver to " any metallic surface which shall possess affinities for quick-" silver; and it may be applied to metals not having such affinities " by means of an intermediate surface, such as galvanized iron."

The method preferred of applying mercury is to allow the plates to remain in a solution of " bichlorid" [bichloride?] of mercury in hydrochloric acid until they are properly amalgamated; they are then taken out and the mercury allowed " to set on the " surface." Plates " for ship's sheathing or iron shipbuilding" are also " dipped into a solution of arseniores" [arsenious?] " acid prepared in the same way as that for the mercurial solu-" tion;" after a short immersion they are dried in an oven, and brushed.

It is stated that " amalgams of mercury so applied with any " other metals *constitute a voltaic pile* repulsive to sea animalcula, " such as barnacle or other shell fish, and also seaweed or other " marine matter containing animal or vegetable life, and prevents " oxidation" of copper.

" When the metals are for house roofing, or for *telegraph* " *wires*, or iron railing, the arsenical solution is dispensed with."

[Printed, 2½d.]

A.D. 1853, August 1.—N° 1795.

POPE, AUGUSTUS RUSSELL.—" A new and useful or improved " electro-magnetic alarm apparatus, to be applied to a door or " window, or both, of a dwelling house or other building, for the " purpose of giving an alarm in case of an attempt to open said " door or window."

The apparatus consists of a galvanic or other electric battery, from which circuit wires proceed to the various places to be protected, to an electro-magnet with "circuit breaker" and bell-hammer pendulous armature, and to " an automatic or self-acting " key."

The operation of this combination of apparatus is as follows:—When the door is closed, or the window sash down, the circuit is broken, because the spring of the key is thrown out of connection with the circuit wire by the pressure of a stud in the door or window; as soon, however, as the door or window is opened, the spring comes against a plate in connection with the circuit wire, and completes the circuit, the armature of the bell-hammer is then attracted to the electro-magnet, and the bell struck. Between one of the poles of the electro-magnet and the armature is a spring, in the circuit unless thrown out by the attraction of the armature; this apparatus is called the " circuit breaker," and as long as the door or window is open, it enables the bell to be rung, by alternately breaking and completing the circuit.

[Printed, 5½d.]

A.D. 1853, August 2.—N° 1806.

FONTAINEMOREAU, PETER ARMAND le Comte de (*a communication*).—" An improved mode of regulating the electric light."

This apparatus is constructed so that it does not cast a shadow downwards. The electrodes are mounted on brass pillars attached to metal rings, fitted so as to turn freely on a horizontal wooden cylinder. The current that gives the light excites an electro-magnet, whose keeper interferes with the revolution of a fly when attracted towards the magnet; the clockwork of the fly also carries a grooved pulley, over two grooves of which cords pass from the electrodes. Two springs, attached to the wooden cylinder, constantly tend to force the electrodes together, but are prevented from doing so as long as the wheel train is stopped by the action of the electro-magnet. Two other rings and pillars are

similarly attached to the wooden cylinder, and provide a fresh pair of electrodes as soon as the first pair are exhausted; for this purpose the rings are mounted on spiral springs, which are released by the springs actuating the electrodes when they arrive near the extremity of their action.

[Printed, 8½d.]

A.D. 1853, August 12.—N° 1889.

ALLAN, Thomas.—"Improvements in electric conductors and "in the means of insulating electric conductors," *consisting of*:—

1st. "Forming the electrical conductors of submarine and sub-"terranean telegraphs of iron rods, wires, or strands of wires, in-"sulated or otherwise, in lieu of copper, as now used."

For submarine telegraphs, a rope or strand of iron wires forms not only the conducting medium, but also the rope itself.

The insulating medium employed "is a compound of caout-"chouc, sulphur, and coal tar, or other similar substance baked "hard," and resembling in appearance Mr. Goodyear's invention (N° 14,299, Old Law), which itself might be employed

In some cases strands of wires of two different metals, iron and copper or iron and zinc, for example, are used for the above purposes and for over-ground telegraphs.

2nd. A "mode of insulating several wires at one operation." As many hollow mandrils, of different apertures, as coatings are required are placed one behind another in a die piece; the wire entering at the smallest, and leaving at the largest. As many series of these hollow mandrils are required as there are wires to coat, worked as if they were but one; and if required to be formed into one rope, the die has an extra mouth-piece.

[Printed, 3½d.]

A.D. 1853, August 12.—N° 1892.

PICCIOTTO, Daniel Illel (*a communication from Chevalier Gaetano Bonelli*).—"Improvements in weaving."

This invention consists in employing a series of electro-magnets "to select the thread for producing the pattern in place of using "perforated cards, tappets, and other instruments as heretofore."

To the armature or keeper of each electro-magnet is fixed a suitable wire or hook, "by which means when the armature or keeper

" is attracted to its magnet the particular thread or threads in " connection will be acted on."

The following methods of exciting the particular electro-magnets necessary to form the desired pattern are set forth :—

A suitably perforated paper is moved over a metal drum in contact with one battery pole; a spring in contact with the coil terminal completes the circuit at every perforation.

When the pattern is produced by "flushing," the circuit is completed by springs, under which a suitably varnished metal roller revolves. An endless band of thin metal, on which the pattern is designed, held extended between two rollers, is used when the pattern is large.

"When the pattern is formed by the passage of different " shuttles carrying different coloured yarns," the pattern surface is arranged "to raise the proper portion of the warp for the passage " of each shuttle." This is done by composing the pattern (as printer's type is composed) in small rectangular pieces of wood or metal of different heights, according to the color they are intended to represent. A frame (in which pieces or slides of metal in connection with the electro-magnets are free to slide) is placed over each row of wooden type in succession, and battery connection is made with those electro-magnets whose metal slides stand up by a blade in connection with the battery.

It must be understood, in the above arrangements, that between each throw of the shuttle, a table carrying the keepers ascends so as to bring them in contact with the magnets, only those keepers remaining so whose magnets are excited. This table also serves to give motion to the pattern cylinder.

[Printed, 7½*d*.]

A.D. 1853, August 15.—N° 1909.

DERING, George Edward. — " Improvements in electric " telegraphs."

This invention consists in "the use of the element of distance " between uninsulated or partially insulated wires or conductors " as a means of insulation for telegraphic purposes."

To put this invention into practice, the uninsulated or partially insulated wires are at such a distance apart that the electric current would meet with more resistance in passing from one wire to the other than in following the wire. For this purpose the two circuit wires of an electric telegraph are placed a distance apart equal to

one-tenth or one-twentieth of the total length of the line wires, being insulated where they approach one another to communicate with the instruments or batteries or intermediate stations.

In the case of making the return circuit through the earth or water, the connections with the earth or water are established at a suitable distance (as explained above) from the uninsulated conductor, an insulated conductor being employed for that distance. Plates of dissimilar metals may be employed at the extremities of the earth circuit, thus affording an electrical current available for signalling.

Two or more wires of dissimilar metal or material may be used, so as to generate an electric current, and thereby give signals.

Quantity currents are by preference used in telegraphic circuits on this principle.

In the case of uniting Great Britain telegraphically with America, the circuit would be composed of an oblong parallelogram, the shorter sides of which would be insulated wires along both coasts (in Great Britain from Land's End to the Giant's Causeway), and the longer sides, the uninsulated conductors, across the Atlantic.

[Printed, 4½*d.*]

A.D. 1853, August 18.—N° 1934.

LARMANJAT, JEAN.—(*Provisional Protection only.*) "Certain "improvements in obtaining motive power."

An electro-magnetic engine is described and shown, in which the fixed magnet "is composed of an iron centre piece, around "which are mounted 4 or more rims," "from which a certain "number of teeth project, and are separated from each other "by an insulating body."

It would appear from the Provisional Specification and Drawings that the machine consists of a "centre piece," shaft, or axle, carrying (by means of end plates) iron rollers (mounted in bearings concentric to the axle and to the toothed rims, and resting on the rims, one to each tooth), to which motion is given by the "teeth" of the rims above alluded to, which are magnetized when the rollers are on the insulated portion by means of a suitable commutator, and attract them accordingly. Although in the Provisional Specification it is stated that "the electric current is distributed in the "magnets, and serves to magnetise the iron teeth," there is reason

to believe from the drawings that insulated coils of wire surround the "centre piece" between the rims.

"There is a point of rest when the rollers are on the insulated
" parts of the magnet, but this point can be made use of by a
" second machine, whose rollers would be on the unmagnetised
" part at the same time that those of the first are on the insulated
" body, and *vice versâ*."

A fly wheel is used with the apparatus shown.

[Printed, 6½d.]

A.D. 1853, August 29.—N° 2003.

FONTAINEMOREAU, Peter Armand le Comte de (*a communication*).—"Certain improvements in the production of " electricity."

This invention consists in the employment of hydrochloric acid as a battery solution, and in maintaining its strength by the addition of hydrochloric acid gas or of chlorine gas.

A battery, composed of carbon and zinc, is described and shown, in which the hydrochloric acid gas or chlorine gas is supplied to the porous vessel containing the carbon by tubes communicating with each cell (one to each cell) from a reservoir that receives the gas from "a suitable generator." "The porous vessel is covered " over with a plate having three perforations," viz., one to receive the carbon, one to receive the supply tube from the reservoir, which dips nearly to the bottom of the cell, and a third (which may be at the bottom of the vessel) to discharge the contents of the cell.

The hydrochloric acid in the carbon cell is used in a concentrated state, and may be used alone or mixed with nitric acid or other acids, or with nitrate of soda or other salts. Diluted hydrochloric acid is used to the zinc cell.

Sulphuric acid may be used to the carbon cell, and hydrochloric acid to the zinc cell, "the said acids being diluted with water " according to the degree of strength required."

[Printed, 5½d.]

A.D. 1853, August 30.—N° 2009.

GOODYEAR, Charles.—"Improvements in the manufacture " and ornamenting or coating of articles when compounds " containing india-rubber are used."

This invention consists "of ornamenting or coating articles "composed of India-rubber and sulphur (with or without other "matters) by electro-deposits of metal thereon." (See Printed Specification, N° 14,299, Old Law.)

The above-named articles have the whole or part of their surfaces made "conductive" by one of the following methods :—

Plumbago or powdered metal may be dusted over them when in a plastic state, and pressed into the surfaces when moulding; the articles are retained in moulds until "the process of heat" has been performed.

In addition to the above process, the plumbago or powdered metal may be combined with the India-rubber when in a plastic state.

The plumbago or powdered metal may be combined with India-rubber cement, and applied as a coating to the surfaces or parts of surfaces to be electro-coated.

In addition to applying plumbago over the surface, it is sometimes desirable to drive in pins of metal, "by which means the "coating of metal which is produced will be held secure by reason "of the pins."

[Printed, 3½d.]

A.D. 1853, September 2.—N° 2032.

CAROSIO, Augustino.—"Improvements in obtaining power by "the aid of an electric current for motive and telegraphic purposes."

The electric current is obtained from a "Grove's gas battery," and is applied to the decomposition of water; "the gases produced "from such decomposition are turned to account to supply the "gases which are recombined in the battery," as described in the Specification of Letters Patent, N° 575 (1853). The electric current obtained from this apparatus sets in motion any suitable magnetic apparatus, thus giving a power applicable to motive and telegraphic purposes.

If a "De la Rive's condenser" is used, induction currents are produced, "which may be employed in place of galvanic battery "currents for telegraphic or other purposes, or they may be united "with the direct current for the decomposition of water;" "the "conducting wires constituting the coils" should be stout and short.

[Printed, 2½d.]

A.D. 1853, September 3.—N° 2036.

DOBELL, Ebenezer.—(*Provisional Protection only.*) "Improve-
"ments in clocks or time-keepers, and parts connected there-
"with."

"The invention relates to so arranging parts in connection "with time-keepers that a series of such time-keepers, being "connected together by an electric current, may, at certain periods, "be set to uniform time."

Instead of the minute wheel being rotated "by the friction of a "spring, as at present," "a pair of discs, carrying friction sur-"faces of leather, or other suitable material," are applied; one "being attached to the minute wheel, the other being capable of "rotating with the 'centre wheel,' and of sliding thereon, so as to "be in friction contact with or be free of the other disc on the "minute wheel." When an electro-magnet, by acting upon levers, removes the disc on the centre wheel from contact with that on the minute wheel, a spring lever inserts its wedge-formed end into a suitable recess on the minute wheel disc, thus setting the clock to time.

The setting may take place and the current traverse once in twelve hours. Wires used at other times for telegraph purposes may be used to complete the circuit.

[Printed, 2½d.]

A.D. 1853, September 12.—N° 2107.

LILLEY, John, junior.—"Improvements in mariners' com-
"passes."

This invention consists of supporting the outer gimbal ring and attaching it to the binnacle by means of bands of India-rubber, instead of by fixed axes, as heretofore, the elastic bands serving as non-conductors of motion, and thereby preventing the movement of the vessel from being communicated to the card; the said bands make an angle of about 70° with the horizon.

The same object may be imperfectly attained by supporting the outer gimbal ring "by metallic springs from below;" but the method of suspension by India-rubber bands, as above described, is preferred.

[Printed, 5½d.]

A.D. 1853, October 6.—N° 2285.

DE CASTRO, MANUEL FERNANDEZ.—"Improved means of "preventing accidents on railways."

Electricity is rendered available for this purpose by the following means:—

"A battery or generator of electricity," of sufficient power to produce a spark, is carried by each train; one of the poles is in connection with suitably placed insulated wires along the line, and the other pole communicates with the earth. When another train comes on to a portion of the line, having the same length of conducting wire as the first-mentioned train, it completes the electric circuit, and puts into action an "alarm apparatus," which closes the induction steam pipe of the engine, and releases a weight to act upon the breaks.

To avoid danger from open "drawbridges, swing-bridges," &c., the opening of the bridge brings the conductor into connection with the earth.

The danger of a collision upon a crossing is avoided by having conductors passing across all the lines in connection with each other.

The alarm apparatus "may consist of Volta's pistol," and acts upon a lever having the cork discharged from the pistol at one end, thus closing the steam pipe. The weight acting on the breaks is released by the same lever, which has a "finger" passing through a ring for that purpose.

A break, which acts "by the explosion of the Volta pistol," consists of a lever applied to the framing carrying the wheels, which ordinarily raises the carriage so that the wheels can run on the line; but when let go from its detaining catch, permits small wheels and wrought-iron arms, shod with hemp, to descend on to the rails, and act as a break. In this instance the weight of the carriage creates the necessary friction.

[Printed, 6½d.]

A.D. 1853, October 7.—N° 2292.

ELLIS, WILLIAM.—(*Provisional Protection only.*) "Improve- "ments in the manufacture and in the ornamenting of china, "porcelain, and pottery wares."

This invention "consists in ornamenting china and pottery "wares generally with metal or alloys of metal deposited by the

" electrotype process." "In order to fit the wares for receiving " and retaining the deposited metal, as well as for the purpose of " hardening them," "the oxides of the metal" are mixed with the ware previous to its being baked or fired, or the wares are ither wholly or partially steeped in some metallic salt, or they may be coated with plumbago or metal reduced to fine powder.

[Printed, 2½d.]

A.D. 1853, October 8.—N° 2307.

WILKINSON, William.—(*Provisional Protection only.*) "Im-" provements in protecting telegraph wires."

There is taken "a piece of metal corrugated in the direction of " its length, and with two plain or corrugated sides or flaps;" also "as many wires as corrugations," the wires being coated " with gutta percha, bitumen, or other insulating medium;" one wire is placed " in each trough formed by the longitudinal corru-" gations in the metal." The flaps or sides are then bent down over the wires, and pressure is applied thereon, "so that the whole " may form a band or belt which may be readily coiled, and which " will form a strong protection to telegraph wires."

[Printed, 2½d.]

A.D. 1853, October 8.—N° 2309.

POTTS, William.—This invention consists in combining "metal " work deposited or partly deposited by the processes of electro-" metallurgy with marble or stone work," in the manufacture of mantel-pieces.

The metal work is deposited "in flexible or other moulds as " most convenient," and "when bronzed or finished by the " ordinary processes, is fitted and attached to the marble or stone " architectural parts of the mantel-pieces by screws and burs, " or spring plugs, or any other convenient means." Ornamental subjects "cast in metal and electro-plated" may be employed in some cases.

[Printed, 2½d.]

A.D. 1853, October 12.—N° 2340.

CALLAN, Nicholas.—"A means of protecting iron of every " kind against the action of the weather and of various corroding

"substances, so that iron thus protected will answer for roofing, "cisterns, baths, gutters, pipes, window frames," [*electric?*] "*telegraphic wires*, for marine and various other purposes."

This invention consists of coating iron with an alloy of lead and tin, and it is preferred that the alloy should contain at least as much lead as tin, and not more than seven or eight times as much; when "the quantity of lead is five or six times as great as that of "tin," the alloy "will resist the action of concentrated nitric, "sulphuric, or muriatic acid." The addition of zinc to this alloy increases its hardness, but diminishes its power to resist corrosion; antimony increases both the hardness and resistance to corrosion.

The process is as follows:—Iron "is first coated (in the way in "which it is usually tinned) with tin or with an alloy of lead and "tin, which alloy contains a moderate quantity of lead." If this first coating does not contain sufficient lead for the purpose intended, the iron "is dipped into melted lead, or into an alloy of "lead and tin, which alloy contains a considerable quantity of "lead compared with that of tin." "The melted metal or alloy "is covered with some fatty substance or other material to prevent "oxidation."

[Printed, 2½*d.*]

A.D. 1853, October 12.—N° 2345.

MAPPLE, Henry, and MAPPLE, Daniel Moore.—(*Provisional Protection only.*) "An improved printing and signal "electric telegraph, with electric alarum attached."

In the printing apparatus a type wheel revolves "by means of "one or more permanent or electro-magnates being made to "vibrate in front of an electro-magnate," the letter is thereby brought to the point required; or one or more magnets may be placed on the type-wheel axis. The letter is printed by an electric current from the distant station shifting the frame carrying the type wheel; the type is inked by revolving "in contact with a "roller prepared with printing ink."

"An improved key frame or pedal" is attached to the printing instrument. Each key comes in contact with a break, which makes the required number of breaks and contacts, and regulates the speed of working; or a vibrating handle can be used.

In the "call signal or alarum," an electric current from the distant station acts upon a lever, and releases weights which fall on the bell or hammer lever; the weights are replaced as may be required.

In order to enable the permanent magnets of electric telegraphs to retain their power, they are "tipt" with iron points, which points "are carried into the electric coils."

"Instead of centers or pivots," a piece of silk, passed through or over the permanent magnet, and stretched by a weight or weights, forms the axis of motion of the magnetized body. "By "twisting the thread on one side or the other the pointer is put "in exact position."

[Printed, 2½d.]

A.D. 1853, October 13.—N° 2361.

MEINIG, Charles Ludovic Augustus.—"Improvements in "galvanic batteries."

This invention relates to portable batteries that "may be carried "in the pocket or otherwise appended to the body while in "action." Strips of soldered copper and zinc plates are fixed while hot into a slab of gutta percha, having ridges or ribs for the reception of the strips on opposite sides; a series of cells are thus formed, like a very shallow Cruikshank's battery. To enable these batteries to be placed in any required position without letting out the fluid, the cells may be filled with "fibrous non-"conducting and absorbing material," or with a metallic powder or paste, or a second slab of gutta percha may be fixed over the cells by means of projecting points.

A battery is also described and shown, in which the plates are fixed radially on a circular slab, in several sets, with connections by which a greater or less number of cells may be brought into action.

A considerable intensity in small bulk can be had by fixing plates on both sides of the same slab.

To apply the above-mentioned batteries to the human body, metallic discs connected to their poles are retained in contact with any part desired by means of sticking plaster; a piece of plaster larger than the disc, and including it completely, being employed.

The metallic paste above mentioned consists of an oxide or salt of a metal which is more negative than the positive metal of the

battery; or "a dry metallic acid, such as antimonic, phosphoric, " or arsenic acid" may be used instead of the oxide or salt; either of these ingredients are pulverized and mixed with powdered starch, to which powdered glass may be added; this paste gives great constancy to the action of the battery.

[Printed, 5½d.]

A.D. 1853, October 14.—N° 2371.

FARRELL, JOHN.—(*Provisional Protection only.*) "Improve- " ments in the means of insulating wire."

"This invention consists in applying a composition consisting " of tar and powdered charcoal in place of or in addition to the " insulating materials now used for coating wire."

[Printed, 2½d.]

A.D. 1853, October 14.—N° 2372.

CADOGAN, FREDERICK WILLIAM.—"Improvements in the " means of obtaining telegraphic communications, applicable to " armies in the field."

This invention consists in making the electric telegraphic apparatus portable, and in laying and taking up the insulated wire in any required direction.

"For this purpose a carriage is employed, divided into two com- " partments," one containing the batteries and the apparatus for winding and unwinding the insulated wire, the other the telegraphic instrument and "seats for the persons communicating " or receiving information."

The rollers, having insulated wire wound thereon, are capable of being placed in bearings when required to run out or receive wire; in running out the wire a break lever is used, and in taking in the wire a clutch brings spur gear into action. Spare rollers may be placed under the seats.

"There is attached to the carriage a Manby's mortar, or other " suitable apparatus for throwing an insulated wire across a river " or other inland water."

[Printed, 1*s.* 1½*d.*]

A.D. 1853, October 15.—N° 2382.

WOODCOCK, THOMAS.—(*Provisional Protection only.*) "Im-"proved means of cutting, carving, engraving, piercing, or "embossing metallic or other surfaces."

This invention consists in withdrawing the tool from the work, when it is not intended to act upon the same, by means of a powerful electro-magnet. The electric circuit may be completed, when required to act on the electro-magnet, by a tracing point, which at such times passes over metallic portions of a design connected to a galvanic battery; at other times, when the tool is required to act on the work, the tracing point passes over non-conducting portions of the design.

The motive power for cutting or acting upon the work may be of any available kind and applied in any suitable manner.

"For piercing or embossing, the electro-magnet, instead of "acting direct on the tool, may be made to open or shut the "steam valve of a small cylinder, the piston of which will act on "the punch, and force it down when required, that is, when steam "is admitted to the cylinder."

[Printed, 2½d.]

A.D. 1853, October 24.—N° 2448.

KRAUT, HENRY.—"Improvements in apparatus for regulating "the temperature of stoves and furnaces, and of water, air, or "other fluids contained in vessels or chambers, the strength of "spirituous liquors and of chemical mixtures, and the hygrometric "state of the air in buildings, rooms, &c."

In this invention an electric circuit is completed by one of the following means:—

The expansion or dissimilar expansion of metals by heat.

By a float or gauge in a liquid, rising or falling according to its height or density.

For regulating the hygrometric state of the air in buildings the hygrometer brings the poles into contact.

On the completion of the circuit an included electro-magnet or electro-magnets act upon wires or chains connected with the damper, or valve, or cock, by means of a lever.

When a certain degree of temperature has to be maintained with the least possible variation, a thermo-electric battery (excited by the heat of the furnace) deflects a galvanometer needle that com-

pletes the circuit at any given deflection. The thermo-electric battery in this instance supplies the place of a thermometer.

The electric current necessary "may be produced either by the "thermo-electric battery, by the rotary battery, or by the common "or constant battery."

[Printed, 7½d.]

A.D. 1853, October 25.—N° 2457.

VERDUN, Jean Baptiste.—(*Provisional Protection only.*) "Improvements in the construction of globes," in which "*an* "*electric or other light*" may be set in the centre.

This invention "consists in a new mode of constructing globes "representing the earth or the heavens, and also uranographic "machines, georamas, and cosmoramas." In the first system of construction, a screw passing down the centre of a tube raises or lowers a disc, to which the envelope of the globe is attached at one of the poles, another disc at the other pole is fixed to the top of the tube; between these discs the envelope is carried by wooden circles parallel to the equator that are connected by radiating rods with rings on the tube; on the screw being turned in one direction, the moveable disc causes the envelope to open, and on its being moved in the opposite, the envelope forming the globe is shut. In the second system, the ribs or circles are hinged to both discs, like the ribs of an umbrella, and are made of wood, cane, or whalebone; they are in the direction of meridians of longitude, and fold up the envelope parallel to the axis by means of a screw in the tube connected to one disc working into a nut in a smaller and interior tube connected to the other disc.

Several globes of the above construction might represent the planets, and "another globe covered with a diaphragm cloth, "having an electric or other light set in the centre, would serve "to illumine the planets in the rotative motions given to them."

[Printed, 6½d.]

A.D. 1853, October 27.—N° 2486.

DERING, George Edward.—"Improvements in galvanic bat-"teries," consisting of:—

1st. "The use of acid solutions in contact with the negative "elements of batteries having any suitable exciting liquids not

" composed of free mineral acids applied to their positive ele-
" ments." The arrangement preferred consists of copper or platinized silver excited by dilute hydrochloric acid, and amalgamated zinc excited "by plain water or sea water, or a solution of " common salt, or of chloride of zinc."

2nd. "The application of porous divisions of earthenware or " other material to troughs, or cells, or vessels, wholly or partly " constructed of gutta percha, or india-rubber, or like materials, " or compounds containing such materials." A battery of this " kind is very applicable to an arrangement according to the 1st improvement.

3rd. "The use of lead as a negative element" "in batteries for " working electric telegraphs or clocks." A constant battery consists of acetate of lead solution in contact with lead negative plates, and zinc positive plates excited by a solution of common salt; or copper may take the place of lead, as it soon becomes coated with that metal when the circuit is completed.

4th. "The use of iron as a positive element" in electric telegraph or clock batteries. Copper and iron, separated by a porous division, with weak sulphuric acid may be used successfully.

5th. "The rendering air-tight by any suitable means batteries " employed for working electric telegraphs." It is preferred to use cells or troughs of gutta percha, "and covers of the same ma-" terial, firmly attached with close joints by the aid of heat and " proper cements; each cell of a compound battery should be " closed independently of the others."

[Printed, 3½d.]

A.D. 1853, October 28.—N° 2498.

WILKINS, John Walker.—"Improvements in obtaining " power by electro-magnetism."

The electro-magnets employed are " constructed and ar-" ranged in such manner that the current of electricity passing " through the wire wound round any one pole of any mag-" net shall assist in magnetising other magnets by which it " may be surrounded." The " magnets consist of several " horseshoe magnets, each being formed of square or other " angular shaped bars of iron wrapped with insulated wire, " according to the ordinary method of making electro-magnets. " These magnets are arranged in a series, side by side, in such " manner that the electric current passing through the wire of

" one electro-magnet shall influence the iron of the adjacent " electro-magnets, which wire shall thus become or be as part of " the wire surrounding the adjacent magnets, and so that the iron " forming any one magnet shall not only be influenced by the " whole of the wire wrapped on it, but also by the wire wrapped " on the iron bars of the magnets next adjacent on all sides." A block composed according to this plan is shown in the Drawings, in which the pole of each adjacent magnet is of an opposite name; the whole forms a rectangular block.

In using magnetism as a motive power, a frame is suspended or placed in front of a block of magnets; the frame carries armatures to each pair of poles, and will be attracted to the poles on the passing of an electric current through the wire of the magnets; any simple contrivance may release the keeper, and from the reciprocating motion thus produced "powerful motion in any form " may be obtained."

[Printed, 4½*d.*]

A.D. 1853, November 3.—N° 2548.

WOOD, WILLIAM.—(*Provisional Protection only.*) " Abstracting " and condensing smoke arising from steam engines and other " furnaces, and obtaining a supply of air for supporting the com- " bustion of the fuel in such furnaces, thereby superseding the " necessity of chimney shafts and funnels."

"The smoke is abstracted by means of fans having a rotary " motion communicated to them by means of wind, water, steam, " air, compressed air, gas, *galvanism*, *electro-magnetism*, animal, " manual, or any other known power, working in a box having a " communication with the flue or flues of the furnace or furnaces " by means of pipes entering at both sides of such box, thereby " producing a partial vacuum, and causing the necessary supply " of air to rush through the furnace to support combustion, like- " wise the centrifugal force, by which the smoke is forced into the " water necessary for its condensation."

[Printed, 6½*d.*]

A.D. 1853, November 7.—N° 2579.

PERSHOUSE, HENRY, and MORRIS, TIMOTHY.—" An im- " provement or improvements in the deposition of metals an " metallic alloys" by means of electricity.

This invention consists of "separating the solution which con-
" tains the surface on which metal or alloy" [is?] "to be depo-
" sited from the solution which contains the metal or alloy to be
" dissolved, by a porous partition or diaphragm, which permits
" the passage of electricity, and keeping the solution saturated
" from which metal or alloy is being deposited, by placing therein
" excess of any suitable salt or compound of the metal or alloy
" being deposited." "Zinc and dilute sulphuric acid" are used, by preference, in the porous cell. An "excess of the oxide, cyanide,
" carbonate, or other compound of the metal or metals being
" deposited," is placed "in the solution from which deposition is
" taking place." "By this arrangement the deposition of the
" metal or alloy will be effected by an electrical current of less inten-
" sity than is required by the ordinary arrangement."

[Printed, 3½d.]

A.D. 1853, November 17.—N° 2663.

DUGMORE, George, and MILLWARD, George Haywood.—" A new or improved method of signalling or communicating
" between trains on railways."

In this invention a current of electricity circulates "from one
" train, whether at rest or in motion," "in rods laid along the
" line of railway, or through the ordinary rails," and actuates "a
" signal on another train at rest or in motion."

Each locomotive is furnished with a voltaic battery and suitable signalling apparatus (preferably a bell), which is kept constantly in electrical communication with properly mounted and insulated wheels, running on the before-mentioned rods, laid between the rails, by preference.

[Printed, 5½d.]

A.D. 1853, November 17.—N° 2664.

ABRAHAM, Solomon, and ABRAHAM, Samuel Victor.—
" Communicating information or directions to persons in charge
" of railway trains."

This invention relates to establishing electrical communication between the guard and engine-driver of a train by means of insulated wires unwound from a reel in the guard's van, and proceeding along the tops of the carriages to the instrument on the locomotive. A battery and transmitting apparatus (called a "wheel contact maker") are placed in the guard's van or vans,

and a dial signal apparatus, combined with a bell and firework alarum, are placed on the locomotive.

The invention is described under the following heads:—

1st. The signal and alarum apparatus. A circular disc has the necessary signals of instruction or information engraved on equal portions of its circumference, any one of which can be brought, by the action of an electro-magnet, in front of an aperture. Each time the magnet is excited the disc moves one division, until the desired signal appears, when the disc is stationary. On the completion of the circuit a lever armature releases a hammer, which falls upon the curved end of a locking arm; thus releasing clockwork that moves the dial through one division by means of spur gear, at the end of which time the locking arm again enters the locking wheel of the train.

The revolving fly of the clockwork carries striking pieces, that sound the bell each time the clockwork is set in motion.

A heavy hammer is let go, by a pin on one of the clockwork wheels, at certain signals; this striking the stud of a spring needle, ignites percussion powder and discharges a suitably placed rocket or other firework.

2nd. "The wheel contact maker." A wheel, having signals on it similar to those on the dial plate of the signal instrument, makes battery contact by means of metallic arms, against a spring. A ratchet wheel and "pawl" at the end of a hand lever move the wheel.

3rd. A continuous circuit is maintained "while winding on or "unwinding the line or lines of circuit wire without the necessity "of disconnecting the wire or wires from the reel or reels." To carry out this object, battery connection is made with the wire on the reel by means of a fixed spring bearing up against an insulated metallic ring on the reel axis; the ring is connected by a binding screw with the inner terminal of the reel coil.

In the Provisional Specification it is proposed to rotate the signal disc by a "ratchet wheel" and "ordinary escapement, one "tooth escaping at a time," by the action of an electro-magnet. It is also proposed to place in the guard's van "a toothed wheel "contact maker," and to discharge the rocket by means of an electric current traversing "a fine platina wire inserted therein."

Return signals may be made by the engine-driver to the guard by means of the ordinary "well-known methods."

[Printed, 11½d.]

A.D. 1853, November 18.—N° 2677.

GALL, JAMES, junior.—(*Provisional Protection only.*) "Improve-
" ments in electro-magnetic engines."

This invention " consists in adapting and applying to such " engines, magnets, magnetic cylinders of the particular construc- " tion hereafter referred to, and also in their combination with " internal and external drums or cylinders for the passage of " electricity."

" The magnetic cylinders form the terminations of the poles of " double magnets and are mounted on axles at each end; and " the internal and external electric cylinders are also mounted in " such a manner as to be capable of revolving with their cylin- " drical surfaces in close proximity with the magnetic cylinder. " And the cylinders are connected together only with small por- " tions of communication in such a manner that the currents of " electricity may be made to pass without impediment over the " cylindrical surfaces in one direction over those of the internal " cylinders, and in the opposite direction over those of the ex- " ternal cylinders, such cylinders being also connected, with the " magnetic cylinder between them, in such a manner as re- " spectively to receive and impart electric and magnetic in- " fluences. The internal electric cylinders are covered with thin " metallic foil on their outer circumference, and the external " cylinders are lined with the same material. This metallic foil " is made to communicate with the axles which are otherwise " insulated. Upon the axle are also placed a series of metallic " rings connected with each other by wires. Each of these rings " communicates with one of the cylindrical surfaces of metallic foil " and revolves in a cup or trough of mercury. The axles and rings " on which the cylinders revolve are mounted so as to rest and turn " upon antifriction rollers. The motive power thus developed and " communicated to the axle of the magnetic cylinder may be trans- " mitted therefrom by means of pulleys in the ordinary manner."

[Printed, 2½*d*.]

A.D. 1853, November 25.—N° 2746.

DREW, ALEXANDER.—(*Provisional Protection only.*) "Improve-
" ments in ornamenting woven fabrics and other surfaces."

" This invention relates to the preparation of sheet material to " be used in the subsequent ornamentation of woven fabrics, such

" as ladies dresses and other surfaces, on the general system of
" relief ornamentation for which Letters Patent for England were
" granted to Mr. Thomas Auchterlonie, of Glasgow, in the year
" 1850" (N° 12,961 Old Law).

A thin sheet of gutta percha has laid down on it a sheet of gold leaf, the two materials are then united by pressure and heat; devices and figures are cut out of this raw material, and are attached to the fabric by pressure and heat.

"The metal covered sheets may be coated for a similar purpose
" *by the electro-deposit process.*"

[Printed, 2½*d.*]

A.D. 1853, November 26.—N° 2764.

ROUSSELOT, Joseph Scipion.—"An improved application
" of magneto-electricity for driving machinery and for neutralizing
" the impulsive force of machinery in motion."

In applying magneto-electricity to driving machinery, heated atmospheric air is employed (by preference) as a medium for giving motion to an engine. The air is heated by the combustion of the mixed gases produced from the decomposition of water by the electric current.

When this invention is applied to drive a locomotive engine, a "Grove's or other suitable battery" is employed, at starting, to generate the gas; and when, by the combustion of the gas, a sufficient motive power is obtained, a magneto-electric apparatus is brought into connection with the water to be decomposed, and the decomposition continued by that means. The magneto-electric apparatus consists of a series of horseshoe magnets fixed to the framing of the engine in such a position that they will act in connection with coiled soft iron armatures mounted on the axles of the running wheels. An electro-magnetic engine, consisting of helices into which cores are alternately attracted, is employed to force the air into an air chamber, from which the heating chamber and engine cylinders are supplied with air. Previous to entering the engine cylinders the air is further expanded in the valve box "by an electric spark being produced in the presence of the "heated air."

To arrest "the progress of a train by the aid of electro-"magnetism," the electric current, generated as above, is diverted from the decomposing apparatus, &c., to electro-magnets

mounted radially on the brake wheels, and having their effective poles in the circumferences of the wheels in contact with the rails. The clinging tendency of the wheels to the rails stops the train.

[Printed, 7½*d.*]

A.D. 1853, December 6.—N° 2836.

JOHNSON, JOHN HENRY (*a communication from Benjamin Underwood*).—" Improvements in printing oilcloths and other " fabrics."

This invention consists in combining moveable types to form printing surfaces for ornamenting oilcloths and other fabrics; facsimile plates may be made from the blocks, patterns, or devices, " either by the electrotype or stereotype process, in metal or in " any other suitable manner or material."

The main features of this invention are as follows :—

The types are set up in blocks from an original design or " copy," just as printers set up type for ordinary printing, those parts of the design that are to print are set up in elevated square types, and those parts that form no design are set up in blank types; when a block is thus completed it is locked up by "a " metallic furniture or card piece," against which screws in the " end piece " of the block or "form" are made to bear. The " case " to receive the types may have "triangular grooves" in the bottom to receive "angular projections" on the types, and thus fully prevent their dropping out; or it may be flat at the bottom for types without projections.

For cylindrical printing the electrotype or other fac-simile plates are bent round a suitable cylinder.

[Printed, 5½*d.*]

A.D. 1853, December 8.—N° 2846.

HENLEY, WILLIAM THOMAS. — " Improvements in electric " telegraphs."

Magneto-electric machines, in which the armatures revolve within the poles of the horseshoe permanent magnets, and are mounted radially upon the central shaft. When the central shaft is merely moved to the right or left by a handle, the " back cur- " rent " is intercepted into a short circuit or cut off. This is done

either by a circular slide in conjunction with springs and studs, or by a permanent magnet, fixed transversely on the shaft, in connection with iron rods, in the circuit, working on centres, and certain metallic and spring connections.

Another form of magneto-electric machine. The electric current is induced in the armature coils by detaching the armatures from the magnets. For this purpose levers and cams or rollers are used.

In order that any particular wire may be known throughout its length on opening the ground, a tape or yarn is introduced (from which all the wires are numbered) into the rope (See N° 185, 1853, and N° 1779, 1853), thus enabling any particular wire to be readily found.

Apparatus "for showing visual signals." Two magnetic needles are mounted on an axle, in the same plane or nearly so, and actuated by an electro-magnet. To partially neutralize the inductive effect of the magnetic needles on the soft iron of the coils, and to overcome the residual magnetism in the soft iron, moveable and adjustable horseshoe or curved magnets are used. Owing to the greater residual magnetism in the near instrument, it is sometimes desirable to send the current only through the distant instrument; a reversing handle for this purpose is described and shown, in which studs on an axle are deflected against springs and stops. When the near instrument is included in the circuit, the ordinary reversing key, or those specified by the Patentee in N° 12,236 (Old Law), and N° 680 (1852), may be used.

To counteract the effect of the permanent magnets of the magneto-electric machine on the signal needle, a plate of soft iron is placed between them.

A chemical-marking telegraph. It is preferred to use for this telegraph the magneto-electric machine first described, in which the electric current is nearly continuous in one direction; the lever and cam machine may be used, in which case a series of dots are made on the chemically-prepared paper. The transmitting machine consists of a drum or slide on which moveable types are fixed, which passes under a point or roller. The peculiarity is that when the point is in contact with the type, a short circuit of the electric current is completed; and when the point passes over a blank space, the current is transmitted to the distant station, there to mark the paper accordingly. In the receiving or record-

ing apparatus, the style is moved in parallel lines over the paper, the paper being stationary; this is accomplished by clockwork in connection with spur gear, which moves two slides at suitable times, the upper slide (at right angles to the longitudinal slide) carrying the style.

In producing an induced current by means of a voltaic battery and electro-magnet, the armature is fixed, and the current produced by simply breaking or reversing the battery current. This is set forth in the Complete Specification.

To reverse alternate induced currents so as to enable them to pass in one direction, studs and springs are suitably acted upon by a reversing lever, so that when the battery current is reversed, this second reversing apparatus enables the induced current to pass along the telegraph line as required. Similar principles are applied in the construction of finger keys, for using with either of the above-described arrangements, to induce currents from permanent magnets. These particulars are also set forth in the Complete Specification.

In the Complete Specification it is proposed to use an earthenware or glass insulator with flat sides and sharp edges shaped like the regular solids for instance, so as to collect the moisture into drops, and thus throw it off.

[Printed, *4s. 5½d.*]

A.D. 1853, December 12.—N° 2885.

WHITEHOUSE, Edward Orange Wildman.—"Improvements in effecting telegraphic communications."

A chemical-marking telegraph is described and shown, having the following peculiarities:—

A "manipulator" or transmitting instrument, in which a single pressure upon one of the studs or keys records in its entirety any one of the symbols or letters at the distant and near stations. A frame has a number of insulated wires, in connection with the line wires, stretched horizontally across it; on the top plate vertical spring studs are mounted which make connection with the longitudinal wires by means of transverse pins. As each stud spindle is fitted with a different arrangement of pins different combinations of the line wires are brought into action by each stud. In the arrangement shown there are 6 line wires, 27 stretched wires, and 64 stud keys (including the blank key). In one mode

of working this manipulator, the depression of the key establishes a short circuit, thus draining off the current from the line wires. In another mode of working, the same means conveys a current along the line wires.

In another "manipulator," the different letters are produced by the simultaneous depression of the proper studs necessary to form the whole symbol, as each stud makes contact with but one wire.

In a third manipulator, with one stud to each symbol as in the first arrangement, springs under the stud make the requisite contact with points.

A recording or receiving instrument, in which the letters follow each other in parallel lines, and from left to right, as in ordinary writing. The "trackers" or markers are respectively connected with the line wires, and are mounted on an endless band passing over drums. The drum shafts give a slow upward motion to the paper by endless screws, pinions, and racks. Three sets of trackers are used, and when one is leaving the paper on the right-hand side, the next set of trackers is entering on the left-hand side.

The materials used for combining with the paper to produce marks by their electro-chemical decomposition, are those neutral salts whose bases are but slightly soluble when precipitated. Infusions "of nut galls, oak bark, or any other vegetable astrin-" gent containing tannin and gallic acid" may also be used.

A home record may be retained simultaneously with the sending of a message to a distant station, or two stations may be communicated with at the same time, "by the absence of the current of " one instrument corresponding with its presence at the other, and " the blanks upon one paper being equivalent to the marks upon " the other." A stud or key in the circuit effects this object by means of suitably placed springs; a spring under the stud being in connection with the battery, and between the two line-wire springs. The battery spring makes connection with one line-wire spring before it leaves the other. Another key for the same purpose is described and shown, having metal and non-conducting collars and a helical spring, instead of the battery spring.

The electricity used in this invention may either be a "galvanic," " voltaic," "hydro-electric," or "magneto-electric current;" or the power may be obtained by "'intersecting the lines of magnetic " 'force'" by the movement of coils of wire or of permanent magnets near each other.

The words of a speaker and extemporaneous music may be recorded by the use of this invention.

[Printed, 10½d.]

A.D. 1853, December 16.—N° 2920.

WHITEHEAD, Walter George. — (*Provisional Protection only.*) "An improvement or improvements in hats, caps, bonnets "and other coverings for the head."

This invention consists in the introduction into "coverings for "the head, of such combinations of metals or materials as shall "form with the moist skin during the wearing" of the said coverings, "a voltaic or galvanic combination and develope "current of electricity;" the electrical current "curing or relieving "the headache, or other nervous or painful affections in the head "of the wearer."

Parallel wires of copper and zinc may be placed around the interior of the covering; or plates of copper and zinc are introduced "in such parts of the said covering as during wear comes "in contact with the head."

[Printed, 2½d.]

A.D. 1853, December 20.—N° 2956.

CLARK, Josiah Latimer.—"An improvement in insulating "wire used for electric telegraphs, with a view to obviate the "effects of return or inductive currents."

This invention consists in applying a further coating of cheap insulating material, such as bitumen, to wires already insulated by a coating or coatings of gutta percha or India-rubber or their compounds, so as to keep the water or damp earth at a greater distance from the insulated wires than it is without such further or additional coating, and thus to prevent the inductive action caused by the water and damp earth surrounding the ordinary insulated wire when in long lengths.

The bundle or strand of ordinary insulated wires is "passed into "melted bitumen till it has taken up a coating of the desired "thickness;" they are then bound with strong canvass or other fabric, and are ready to lay in the earth.

For subaqueous cables the additionally insulated wire is "covered "by laying wires around the same, as when making electric "telegraph ropes."

[Printed, 2½d.]

A.D. 1853, December 21.—N° 2967.

FARRINGTON, CHARLES JAMES.—(*Provisional Protection only.*) "Improvements in signalling and preventing collisions on "railways by electrical communication."

"The improvements relate to effecting electrical communication "with carriages running on railways, by which, in the event of an "accident taking place on such line of railway, or any other "occasion occurring rendering it necessary to stop an approaching "carriage or train of carriages, electric communication may be "effected with such approaching carriage or train of carriages, to "set in motion apparatus as a signal to the guards or other "persons in charge of such approaching carriage or train of "carriages, that there is a stopping train or other obstruction in "advance of such carriage or carriages."

Arms, projecting at intervals along a line of railway, and included in an electric circuit, are touched by projections from the passing carriages, and as long as there is no accident or other cause for signal, the circuit is broken, and no current thereby passes through the alarum or indicator on the carriages, although they are in connection at intervals with the circuit. But when it is desirable to stop the approach of a coming train, an attendant closes the electric circuit by the nearest key; in this case, when the carriages of the coming train pass the projecting arms, the circuit is completed to the indicating apparatus on the carriage or train, and an indication is made.

[Printed, 2½*d.*]

A.D. 1853, December 28.—N° 3007.

GREEN, RICHARD.—"Improvements in insulators for insulating "the wires or rods employed for conducting or transmitting "electricity."

The principal feature in this invention consists in forming "the screw of the insulator of the same material as the other "part thereof." A mould is taken "of the desired shape of the "insulator complete, that is, with the stem, the cap, and the "screw (for fixing it) shaped in one piece;" into this mould the molten glass is poured "in the manner usually practised by glass "makers of casting glass."

[Printed, 2½*d.*]

A.D. 1853, December 31.—N° 3031.

PHYSICK, Henry Vernon.—"Improvements in electric tele-" "graphs and apparatus connected therewith," consisting of:—

1st. "Making the bearings of the axle of the reversing handle " of electric telegraph instruments of one piece of metal, or of two " pieces of metal firmly fastened together."

2nd. Using a packing of gutta percha, or other non-conductor of sound, to prevent the noise of the stops that limit the motion of the reversing-handle axle. A thin piece of metal (having contact at the side with the stop, to complete the electric circuit) rests on the packing, and receives the percussion of the arm.

3rd. Keeping the reversing handle vertical "independently of its " gravity." Fixed springs bear on an arm or crank fixed to the axle, one spring being on each side.

4th. The electrical charge existing in long lengths of insulated wire is discharged to the earth without having to pass through the needle coil. In a reversing handle constructed with the above-described improvements, a spring connected to the coil and line wire makes and breaks contact with the earth-plate before and after the transmission of the signal.

5th. Using a coil frame and coil of such a shape that the wire is wound round more than half the circle of the needle's motion, and concentric to the needle axis. The needle axis is external to the coil, one of the end plates being bent inwards, V fashion, for admitting the axle.

6th. "Fixing the needle to its axle by means of a screw, in such " a manner that the needle may be taken from the axle without " the latter being removed from the instrument."

7th. Preventing deflection of the needle by the earth current, " by making the coils to move around the axis of the needle in-" stead of moving the stops of the needles around such axis." This improvement is only described in the Provisional Specification.

8th. An insulator to support suspended electric telegraph wires. This insulator consists of an inverted cup with a central projection; an aperture is made through the two sides of the cup and the projection for the wire, thus surrounding the wire by a dry zone of earthenware or glass. The wire rests on a sharp edge in the centre of the projection.

9th. "Using a weight on a lever to counteract the violence with "which an electric time ball falls and catch it, instead of using an "air cylinder and piston as usual at present." This improvement is only mentioned in the Provisional Specification.

[Printed, 5½d.]

1854.

A.D. 1854, January 10.—N° 52.

TYER, EDWARD.—"Improvements in giving signals on railways "by electricity, and in instruments and apparatus connected "therewith," consisting of:—

1st. Instruments and apparatus "for the purpose of closing, "breaking, reversing, or coupling up electric circuits," by the passage of the wheels of a train, so that the position of the train is indicated or recorded at a station or stations.

At certain parts of the line, spring or weighted levers are fixed, which are depressed by the wheels of a passing train, and thus close, break, reverse, or couple up electric circuits by means of a "connector" in connection with the spring lever.

The "connector" has various constructions, according to the work required of it. It may consist of a spring piston (which the spring lever depresses), either alone or in conjunction with other springs; or it may consist of a quadrant or cylinder (suitably inlaid with metal) in conjunction with springs pressing on the quadrant or cylinder, the axis of the spring lever giving motion to the quadrant on the passing of a train. In another form of connector, an elastic bag, partially filled with mercury, may be placed under the spring lever, and make contact with insulated wires in a closed tube or tubes.

2nd. The adjustment of any of the above-described "connectors" in conjunction with the rails of a railway, to close, break, reverse, or couple up electric circuits. The apparatus is fixed in such a position that the deflection of the rail, on the passage of a train, operates upon the "connector."

3rd. "The application and combination of magneto-electric "machines with either of the before-mentioned contrivances, for "the purpose of giving signals on railways." The passage of a

train depresses a spring lever, which acts on a powerful spring piston to which the coils are attached, thus causing the motion of the coils before a permanent magnet, and generating a current of electricity in them that is transmitted to any required point or place.

4th. "Indicators" for signalling the position of an engine or train. In pointer instruments for showing visible signals, the electric circuits above described are made to deflect permanently needles or pointers. This is effected by mounting them so that their centres of suspension are below their centres of gravity. In one instance, an electro-magnet (fitted with stops to limit the amount of deflection of the needle) acts upon a magnetized needle. In a second instance, a galvanometer needle carries on its axis a notched disc, into which the weighted end of a lever descends when the needle is deflected; the needle may either be released by the pressure of the hand on a spring stud, or by electro-magnetic agency. In each of these instruments the pointer always remains in a certain inclined position until observed by the receiver of the message or until another electric current is transmitted.

5th. "Local pole changers," to act upon local batteries and circuits in the above-described arrangements. Electro-magnets in the line-wire circuit attract or repulse spring keepers, thereby bringing points into contact with discs, and completing the local circuit in a corresponding direction.

In the Provisional Specification this part of the invention is said to consist of "certain methods of actuating telegraphic alarums."

6th. A "lock and key" pole changer. The non-conducting bolt of a lock is suitably inlaid with pieces of metal suitably connected with battery circuits; these are closed, broken, reversed, or coupled up by springs bearing on the bolt according to its position. These instruments may be used to transmit appropriate signals to an approaching train, or "to call into action any of "the electro-magnetic instruments herein-before described, either "separately or combined."

7th. Making connection between the line wires and the instrument on the engine, or *vice versâ*. In one method, a spring lever (as described in the 1st improvement), fixed in an inverted position on the engine, makes contact with an insulated metal bar fixed upon the permanent way, parallel to the rails and outside of them. In a second method, the metal bar is fixed to the engine, and the spring lever to the permanent way. In this part

of the invention, the Specification of a former Patent, "dated 20th "July 1852," is referred to; as, however, the Patentee has no Patent of that date, but had one then enrolled, it is most probable that this is the one referred to (See N° 13,906, Old Law).

8th. Using an electro-magnet to shut off the steam of locomotive engines, or to sound whistles; the said electro-magnet being excited by a stationary voltaic battery. When the magnet is excited it releases a lever from a piston rod, thus enabling the steam to force up the piston and find an exit by the whistle. In order to turn the regulator, another piston rod and lever arangement is used, but instead of the steam blowing away, it actuates a second piston rod bearing against the regulator handle. The arrangements described in the 7th improvement make electrical connection between the line wire and the electro-magnet on the engine. A distant train can thus be acted on from a station which it is dangerous to approach.

The following improvements are set forth only in the Provisional Specification.

9th. Insulating suspended telegraph wires. A large hole is bored in the post, into the centre of which a metal spike is driven; the telegraph wire is passed through a small hole in the spike and soldered to it, the whole is then coated with insulating material.

10th. Preventing injury to telegraph instruments by atmospheric electricity. A flat coil of two metallic ribbons is used, one ribbon being insulated from the other by a porous non-conducting material. One ribbon is connected with the earth, the other with the line wires.

11th. Preserving zinc battery plates. A cup containing mercury is formed in the upper part of the plate, thus keeping it thoroughly amalgamated. Also the hydrogen is retained "on the surface of "the zinc plates," by wrapping round the metal a non-conducting porous substance, and retaining the said substance by an elastic band placed at the surface of the liquid.

12th. Exploding detonating signals, &c. This is done by an electrically-heated wire, and may be performed from a station at any distant point, or on an engine. An apparatus for making successive contacts with a number of detonating signals is described and shown, consisting of an inlaid cylinder and fixed springs; an electro-magnet rotates the cylinder.

[Printed, 3s.]

A.D. 1854, January 11.—N° 62.

MASSON, AMBROISE AUGUSTE.—" Improvements in the ma-" nufacture of thread or wire to be used for making gold or silver " lace."

This invention economises the use of gold, by only gilding that portion of the wire which is seen; the gilding being accomplished by electro-deposition after the wire is wound round its core of silk.

The process adopted is as follows:—Silver wire (either pure or alloyed) having been flatted and rolled in the ordinary way, is " wound round amber or gold colored silk, taking care to avoid " any breaks of continuity in the metal. The thread is then " passed by mechanical means through vessels containing auri-" ferous solutions, which are deposited by means of a galvanic or " voltaic battery; it is then washed, dried, and wound round " bobbins. The auriferous solutions may be in a hot or cold state, " and the thread may be steeped or simply immersed." To prevent the deposit occurring upon the portion of the wire covered by the silk, the silk is previously steeped in aqueous solution of stearate of alumina, "or in oleic acid much diluted," and the metal is tightly bound on the silk.

A machine is described and shown for gilding the silver wire when wound round the silk core. The wire is unwound from a bobbin, and passes over the negative pole of the battery into the depositing solution by means of pullies; thence it passes over suitably placed pullies into a water vessel, and over cloth rollers to the bobbin, on which it is finally wound.

[Printed, 7d.]

A.D. 1854, January 11.—N° 63.

WATSON, JOSEPH JOHN WILLIAM.—"Improvements in " signalling," which are as follows:—

The electric light is preferably employed for signalling "by illu-" minating effects." A circular box, whose face has "a number " of holes ranged in the form of a circle near the edge, and in a " line diagonally across, making as it were a diameter," is set on a suitable post. Within the box a disc (having exactly similar holes to the face of the box) is mounted on an axis, so that the

holes of the disc and box, when the disc is rotated, are concentric, and admit light through them intermittently from behind. The effect of this arrangement at a distance is a powerful wavy ring of light crossed by a diagonal line; this is used for signalling to passing trains by means of shutters, which also afford a means of signalling in the day-time. An electro-magnetic engine is preferred to give motion to the disc by means of pullies.

In lighthouses, and for signalling purposes generally, the electric light and above-described perforated face and disc are also used. In this case the light is twice reflected, and before the apertures a frame is placed, having shutters of red glass plates; the apertures of another disc are glazed with white glass of great refractive power. An additional screen, with apertures glazed with green glass, may also be used. The result is the intermittence of powerful red and white, or red, green, and white light. A mode of signalling is thus formed, that the Patentee calls a "chromophotic sema-" "phore."

It is proposed to make electrical communication between the guard and engine-driver of a train by means of a magneto-electric machine in the guard's box, driven by the carriage axle. In each of the vans a "rheostat," described in N° 212 (1852), is placed.

[Printed, 7*d*.]

A.D. 1854, January 11.—N° 68.

BROOMAN, Archibald Richard (*a communication*).—(*Provisional Protection only*.) "Improvements in extracting gold " from the ore."

An amalgamating machine, in which the mercury is "constantly " charged with galvanic or other electricity," consists of a cylindrical cistern in which a hollow shaft rotates. The pulverized ore is supplied to a hopper at the top of the hollow shaft, and descends through openings in hollow radial arms to the bottom of the quicksilver; the ore is thus well diffused through the mercury. The electric current is passed through the apparatus by means of an insulated gold plate, at the bottom of the cistern, to which wires from both battery poles are attached. " The amalgamated gold is by this means precipitated upon the " gold surface, and adheres to it."

[Printed, 8*d*.]

A.D. 1854, January 17.—N° 108.

HIGHTON, Edward. — " Improvements in suspending the " wires of electric telegraphs."

Cross bars or arms are attached " to the sides of the posts one " above another," each arm being " either successively longer or " shorter than the one above it." The wires are attached near to the ends of the arms, and consequently are not in a vertical plane their points of support are also separated by long lengths of non-conducting matter. In one method of mounting the wires, the arms are of the same length but placed at different angles (in plan) with respect to the longitudinal wires. The plane or planes of wires are preferred to be inclined at an angle of 45° to the horizontal plane.

Another improvement consists of hanging the wires in non-parallel curves, the radius of curvature of those nearest the earth being less than that of the wires above them. The wires are thus further apart as they recede from their points of support.

[Printed, 7*d.*]

A.D. 1854, January 18.—N° 117.

CAHILL, Charles Staunton.—(*Provisional Protection only.*) " Improvements in submarine, subterranean, and other electric " and magnetic telegraphs, and in insulating, laying down, join- " ing, and covering the same," which are as follows, viz.:—

" Insulation of conducting wires and other conductors by a new " material consisting of a preparation, mostly of paper, applied in " pulp or otherwise, and rendered anhydrous, non-conducting, " and capable of resisting considerable heat, damp, pressure, and " water, at a great saving of cost compared with any other cover- " ing now in use; and for covering sub-marine and other electric " cables, and other ropes & cables, with flat or corrugated hoop " iron in strips of any breadth, and for rapidly joining (by a " peculiar joint) said cables and conductors. And for avoiding " frictional or other loss of the electric fluid, in long lines of " insulated wires, by a continuous vacuum extending along the " wires from end to end. And for springs looped at the extremi- " ties, and hung so as to prevent the straining or 'kucking' of " electric cables, when paying out of vessels at sea, such springs " being also applicable to many domestic and other purposes."

[Printed, 3*d.*]

A.D. 1854, January 19.—N° 126.

BURSILL, George Henry.—" Improvements in operating " upon metalliferous ores and other minerals, and upon 'slags' " and 'sweep,' in order to facilitate the seperation and recovery " of the metals and other products, also in machinery or apparatus " for effecting such improvements, which is in part applicable to " other purposes," consisting of :—

"The pulverization and grinding of metalliferous ores and " minerals, slags, and sweep in or along with solutions of mercury, " or of the salts of mercury, or in or along with other solutions, or " re-agents that effect either amalgamation itself or precipitation " in a state that facilitates amalgamation and consequent recovery " of the contained metals." The amalgamating solutions preferred are either corrosive sublimate or proto-nitrate of mercury. The minute portions of gold no sooner come in contact with the grinding machinery, or with rakes and scrapers used therein, "than they " become coated with running mercury that is precipitated from " the solution by galvanic agency." The solutions that precipitate the metals (gold or silver, for instance,) as nearly as possible in a metallic state are proto-sulphate of iron, carbonate of soda, or oxalic acid. In every instance the tailings are passed through the amalgamator or separator described in the Specification of a Patent dated February 12, 1853.

The use of pumice and a current of heated air to accelerate oxidation and volatilization, or of a current of hydrogen and pumice for deoxidation, of metals and mineral products.

A means "for disintegrating slag, and for the economical " employment of potash or soda with minerals containing the " same to assist as fluxes in the operation of smelting."

Certain machinery for effecting pulverization and grinding, consisting of rollers and edge runners that are free to move vertically (allowing for difference of size in the material pulverized), are also described.

[Printed, 5*d.*]

A.D. 1854, January 23.—N° 173.

WAGNER, Adolphus Theodore. — (*Provisional Protection only.*) "A psychograph, or apparatus for indicating persons " thoughts by the agency of nervous electricity."

"The apparatus consists of a combination of rods or pieces of "wood joined so as to permit of free action in all the parts. "From one of the legs of the instrument hangs a tracer; on one "or more of the other extremities is fixed a disc, upon which the "operator is to place his hand, and from this extremity or these "extremities depends another tracer. The other parts of the "apparatus consist of a glass slab or other non-conductor, and "of an alphabet and set of figures or numerals. Upon a person "possessing nervous electricity placing his hand upon one of the "discs the instrument will immediately work, and the tracer "will spell upon the alphabet what is passing in the operator's "mind."

[Printed, 3*d.*]

A.D. 1854, January 30.—N° 220.

FONTAINEMOREAU, Peter Armand, le Comte de (*a communication*).—(*Provisional Protection only.*) "Certain arrange- "ments for preventing accidents on railways."

This invention "consists in mechanical arrangements for ena- "bling trains while on the rails to transmit their own signals." At each station four posts are erected "with electric dials, two on "each side of the line, one in advance of the trains stopping, the "other behind, so as to be generally conspicuous."

"Each dial has two faces, a bell, and on each side a moveable "transparent disc with colored compartments."

From the Drawings, taken in conjunction with the Provisional Specification, it would appear that projections on each carriage put into action a ratchet wheel on the pointer axis by means of electro-magnets, "by which means the number of carriages in the "train is shewn." The electro-magnetic arrangement also enables a train to act on the dials from a distance, so that "the "driver of a train, seeing from the dial at a station that another "train was behind him, could have time to run his train off on to "a siding."

The trains remove the signals as soon as their object is effected, a rod being placed in connection with a spur wheel and rack in the post, so as to release the spiral spring of the ratchet wheel on the pointer axis, and bring back the hand to its stationary point.

[Printed, 6*d.*]

A.D. 1854, January 30.—N° 222.

PHILLIPS, William.—(*Provisional Protection only.*) "Im-" "provements in the manufacture of coffins."

These "improvements consist in manufacturing coffins of iron, "and *galvanizing*" [electro-coating or zincing ?], "tinning, "brassing, or bronzing them by any ordinary process."

"In making cast-iron coffins," it is also proposed, "if required, "to cast on the lid the name, age, &c. of the person."

[Printed, 3*d.*]

A.D. 1854, January 31.—N° 235.

ERCKMANN, Caroline.—(*Provisional Protection only.*) "The "manufacture of telegraph wires."

"For gutta percha used at present for the isolation" [insulation ?] "of electric wires from one another," "glass, paper, "cardboard, or wood or bone" is substituted. "The employ-"ment of these substances will isolate the wires better than "gutta percha. It is, however, still necessary to cover the "assemblage of wires with a coat of gutta percha, tar, or other "similar substances.

"To preserve subterranean electric wires from the attacks of "insects, such as ants, &c.," "the matter used to form their "exterior coat" is incorporated with "resinous and bitter "substances, or others of a poisonous nature;" or they may be protected "with a metallic covering."

[Printed, 3*d.*]

A.D. 1854, January 31.—N° 241.

MEEUS, Pierre Joseph.—This invention is entitled "Improve-"ments in producing metallic surfaces," and it refers to either coating articles, or taking casts or "moulds" of them.

The principal feature of the invention is the application of gold or metallic leaf by pressure to surfaces of gutta percha rendered adhesive by heat.

In one portion of the Provisional Specification, and in the corresponding portion of the Complete Specification, it is stated :— "After the moulding has been effected, I sometimes remove the "gutta percha in cases in which I wish to use the coating as a

" material by itself as *a species of electro-typing*," but no further allusion to any application of electricity is made.

The invention is "applicable especially to the production of " imitations of embroidery in gold, silver, or other metals." Many details and processes are given.

[Printed, 4*d*.]

A.D. 1854, February 1.—N° 246.

CHENOT, Claude Bernard Adrien.—" Improvements in " accumulating, conducting, and treating gases of combustion, " and also in generating and applying the same to metallurgic and " other purposes."

This invention relates to utilizing the gases evolved from smelting and other metallurgic furnaces. Various processes and apparatus are described.

In the case of collecting gases " at a very small distance from " the burning point, they will be found to be exclusively composed " of carbonic acid and nitrogen." One of the means used to " precipitate " the carbonic acid from the nitrogen is to establish " an electric current " through a column of gas in a tall receiver. This application of electricity is not mentioned in the Provisional Specification.

In using the gases for refining and moulding metals, they are separated from their fusible alloys or ingredients, " and precipitated " by the calorific, chemical, and mechanical actions of the gases." In the instance of iron, it " is precipitated to the bottom of the " liquid bath by fusion, and fills a mould as the precipitated " metal of a cold dissolution would fill a mould by the action of " electricity, as applied in galvano-plastics." This comparison to an electrical operation is only mentioned in the Complete Specification.

[Printed, 1*s*.]

A.D. 1854, February 1.—N° 255.

JOBSON, John, and JOBSON, Robert.—" Improvements in the manufacture of moulds for casting metals."

This invention consists of "the manufacture of moulds for " casting metals by means of ramming blocks," " either entirely of " metal, or with metallic surfaces firmly attached to a backing of

" Roman cement or other suitable material, which metallic blocks " or surfaces serve for moulding the partings of the sand or other " material forming the mould, as well as for moulding the form " of the article itself."

The method of making "ramming blocks" of lead or alloys by running the melted metal on the sand mould is set forth with various modifications.

To make a ramming block by electro-deposition, an empty box is fixed upon the mould, and luted on "in a water-tight manner;" it is then filled "with a solution of sulphate of copper or other " suitable metallic solution," and the metal is "deposited on the " surface of the mould by means of the electrotype process." The mould is previously rendered non-absorbent, proof against the action of the solution, and conducting. When a sufficient coating is deposited, it is backed with lead or tin, and the box filled up with Roman cement. The iron or other box used is protected from the action of the sulphate of copper solution by means of grease or other suitable material.

The Specification of a Patent granted to John Jobson, October 2nd, 1852, is alluded to.

[Printed, 7*d.*]

A.D. 1854, February 7.—N° 305.

BIANCHI, Barthelemy Urbain.—" Certain improvements in " preventing accidents on railways."

This invention consists "in the construction and application of " electric telegraphic apparatus to indicate at the stations the " positions of trains upon the line, and also to communicate " between the stations and the signalmen or watchmen at the " intermediate points."

Telegraphic wires are suspended along the line and communicate with the stations at which signal apparatus are placed. Along the line, at the side of the rails, "interrupters" are placed at suitable distances apart; the train, in passing these instruments, breaks the circuit, and actuates the signal apparatus at the station or stations. Except when broken by the "interrupters," the galvanic circuit is always closed, the position and progress of the trains along the section of railway to which each signal instrument or set of instruments refers is thus indicated at the station or stations.

The signal instrument has an electro-magnet with a lever armature that detains an escapement wheel as long as the electromagnet is active; but each time a train passes over an "interrupter," the lever allows one tooth of the escapement wheel to escape. A pulley and cord communicate the motion of the escapement wheel to an index that traverses divisions on the front of the instrument corresponding to the number of "interrupters." When the index has arrived at the end of its course, it puts the pulley on the escape-wheel axis out of gear, and allows a spring barrel to act on the cord and index, which brings them into the position they occupied before the starting of the train. A similar apparatus in the same instrument indicates the progress of the trains on the other line of rail. The arrival or departure of trains is also signalled by a moveable plate connected by bell-crank levers and a ratchet wheel to a spring barrel, which is then free to move out of the instrument case, being released by a suitably placed pin on the escape wheel; the same action also revolves a bell hammer.

Another signal instrument is described and shown, in which the indices move from the same centre, the spindle of one working within the spindle of the other. The machinery is nearly the same as that of the first-described apparatus, except that the index axis is driven from the escape wheel by spur gear, and that there is no apparatus for bringing back the indices, "for when they have "finished one course they are ready for recommencing the "next."

Each "interrupter" consists of a cast-iron box containing a lever, which acts by means of a connecting rod on a small lever, to the axis of which the line wire is attached. The end of the small lever usually completes the circuit by dipping into a mercury cup; but when a train depresses the lever, it raises the end of the small lever out of the mercury cup and breaks the circuit.

The sections of the line to which the above-described signal apparatus is applied "are to be of such lengths that no more than "one train is to be upon the same line of rails in any one section "at the same moment." One line wire is used for the up and another for the down line of rails.

The signal apparatus for communicating between the stations and the signal-men at the intermediate points are somewhat similar to that for indicating the position and progress of a train;

a third line wire is devoted to this purpose. A galvanic battery at every alternate station works the three telegraph lines, one battery pole being connected to the three terminals of the up line as well as to those of the down line, and the other battery pole being connected to the earth-plate.

A signal is conveyed to all the signal-men and stations in one section by interrupting the circuit, that interruption causes a bell hammer to rotate and strike a bell, and certain plate signals to be thrust out, according to the number of successive interruptions made.

In connection with or in lieu of these signal apparatus for the signal-men, it is proposed to release the detaining lever of a large signal mounted on a bracket so as to be visible to engine-drivers. When the detaining lever is released, a strong spiral spring turns the signal round so as to display it.

[Printed, 1*s*. 2*d*.]

A.D. 1854, February 16.—N° 371.

VARLEY, Cromwell Fleetwood.—" A new arrangement or " apparatus for transmitting electric telegraph signals."

This invention consists of three parts, viz., a " key," to transmit signals; a "pecker (or relay)," to make local circuit contacts; and a "switch," "to connect the line wire to the key when " sending & to the pecker when receiving a communication."

Both ends of the line are "furnished alike with a key, pecker, " & switch;" and the line-wire current circulates from the battery to the key and "switch" at the transmitting station, through the line wire to the switch at the distant station, then through the galvanometer coils of the "pecker" and earth-plates back to the battery at the transmitting station. The line-wire circuit is always complete and the battery current traversing, except when signals are made. The local circuit is always kept broken by the line-wire current, except when signals are made.

The key consists of a lever working in bearings, and having an axis composed partly of ivory and partly of metal; fixed springs press upon the axis at different parts in such a way, that when the key is at rest a current is completed through the line wire, two of the springs being in connection with the battery poles respectively, one with the "switch," and a third with the earth. On depressing

the lever to transmit a signal, the circuit is broken, an earth connection with the line wire made to discharge "any residual "electricity," and the current reversed.

On the keyboard is also placed the "switch." This instrument consists of a metal spindle, supported in bearings, and having a handle to turn it half a revolution when required. On the spindle are fixed three pins, which make electrical connection with three fixed springs respectively placed under them; one spring is in connection with the line wire, the middle one with the earth, and the third with the "pecker;" the "switch" axis, therefore, in being altered to send or to receive messages (by turning one of its pins into connection with the line wire or with the "pecker"), causes the middle spring and pin to come into momentary contact, thereby relieving "the line wire of its induced charge." The two outside pins project from the spindle opposite to one another; the middle pin is at right angles to the others.

The "pecker" consists of a galvanometer which carries on its needle axis an arm. This arm is so adjusted, in conjunction with the weight of the needle, as to make contact with a spring when no current passes through the line wire and the galvanometer coil. The contact made is a rubbing contact, the contact piece striking against the spring obliquely; the slight cushion of air that would otherwise prevent sure contact is thus rubbed away. The action of the key in connection with the pecker is as follows:—The current keeping the local circuit disjoined is broken, thereby allowing the "pecker" arm to complete the local circuit, the subsequent reversal of the current by the key causes the completion of the local circuit to be aided by the force of deflection as well as that of gravity. The frame carrying the "pecker" also has fixed to it a "plain galvanometer" "mounted as usual," which is included in the line-wire circuit, and acts as an indicator.

The local circuit is used "to print or otherwise render signals."

This invention is peculiarly adapted to telegraphs having the submarine or subterranean wires of great length.

[Printed, *7d.*

A.D. 1854, February 21.—N° 414.

WALKER, Robert.—"Improvements in signalling by voltaic "electricity, for the purpose of increasing the safety of rail"ways."

This invention relates to arrangements of line wires along a line of railway in connection with galvanic batteries at stations, to enable the guard of a train to signal accidents or stoppages to the stations before and behind.

Mainly this invention consists of the following arrangement:— Two line wires are used, "one wire is connected at its extremities "with positive elements or poles of a pair of voltaic generators, "and the other with negative elements." In case of accident a metallic connection of the two wires by the guard, by means of a "spring clamp" mounted appropriately, conveys signals in both directions, as it brings into action both batteries.

There are, however, the following modifications:—

One of the two wires is connected to the the positive battery pole at one extremity, and the other to the negative battery pole at the other extremity of the line; the remaining extremities of the wires are free, and the remaining battery poles are connected with the earth. No circuit is formed until the connection of the wires.

In another arrangement, a third insulated line wire takes the place of the earth return-circuit, thus affording a means of communicating in either or both directions from a given locality, as may be desired.

In a fourth arrangement, similar battery poles are at the extremity of one line wire, and two other line wires are used in connection with the other similar battery poles; the other extremities of the latter wires are free. In this arrangement communication may be made in either or both directions.

The instrument preferred for coupling the wires consists of a handle with two metal arms hooked at the ends; these are insulated from one another and connected at pleasure by a key in the handle. A small galvanometer is attached to the handle, its coil being interposed between the springs or arms; by means of this appendage signals can be received by the guard from the stations.

[Printed, 10*d*.]

A.D. 1854, February 25.—N° 459.

SIEMENS, Charles William (*partly a communication*).— "Improvements in electric telegraphs," consisting of:—

1st. An improved insulator for suspended line wires. The line wire is supported by a wrought-iron hook, whose "stalk" is

cemented into an inverted cup or thimble of porcelain or other non-conducting material; this thimble is again cemented into an inverted cast-iron bell, which is secured to the post or wall by a screw or screws. It is preferred to use sulphur as a cement, and the projecting rim of the thimble should present a smooth surface, "in order to prevent the adhesion of moisture."

A larger insulator with two notches and wedges is used at stretching posts, to fasten "the ends of adjoining pieces of tele- "graphic line wire."

2nd. "Discharging the static electricity or lightning from tele- "graphic line wire through a vacuous space between two metallic "surfaces, which are attached, the one to the line wire, the other "to the earth." A cylinder of glass or other non-conducting material is cemented perfectly air-tight between two metallic covers; a metallic disc, screwed into one of the covers, regulates the distance between the line-wire circuit and the earth connection. Before using the instrument, the air is extracted from a hole in one of the covers, fitted with a concealed stopcock.

3rd. Establishing "telegraphic communication along a railway "train which is in motion." This part of the invention has the following peculiarities:—

The circuit necessary for communication is formed by connecting the similar poles of two batteries of equal power, each battery being placed at one extremity of the train. Signals can thus be sent from any intermediate point simultaneously in both directions by connecting the two portions of the circuit at that point; a finger, key, or contact lever may be used for that purpose.

The circuit is completed from carriage to carriage of the train "through the draw chains and the side chains usually "connecting the carriages composing the train." The forward (or return) circuit may be made through either or both of the carriage connections, or through the wheels and rails; the return (or forward) circuit being made by any one or more of the before-mentioned channels not used for the forward (or return) circuit; the forward circuit being from the guard to the engine-driver, and the return circuit in the opposite direction. If the frame of the carriage is of iron, the side chain bolts are insulated from it by means of a tube and washers of gutta percha; the same nut that fastens the washers and bolt to the frame secures the circuit wire that passes under the carriage framing.

It is preferred to use a Daniell's battery having the copper in the porous cells; the porous cell has "a truncated cone of gutta "percha," or hopper, cemented to its upper end, to contain the sulphate of copper crystals.

The alarum preferred to be used has a hand connected to the armature lever, and two bells of different sound, struck alternately by clockwork released by the armature lever when its electro-magnet is excited. An indicator or lever, connected by a toothed segment and pin-wheel to the main-spring axis of the clockwork, shows when the spring requires winding up.

[Printed, 11*d.*]

A.D. 1854, February 28.—N° 478.

DENNY, Theobald.—"Improvements in engraving."

Engravings are produced on metallic plates (preferably steel), suitable for ordinary surface printing, by the following process:—

A plate of polished steel is covered with a solution of caoutchouc, which is then blackened by passing over it an ignited wick saturated with spirits of turpentine. Heat is applied underneath the plate "till its oxidation gives it a bluish white color." Upon this surface, thus dried, the drawing is made, and etched with a fine point; it is then moistened with a solution of virgin wax in naptha, which is rubbed off with wadding cotton.

The plate is next plunged, for two seconds, into a bath of distilled water, holding in solution cyanide of potassium, a little tannin, sulphate of copper, and caustic potash; the plate is then electro-coppered by this solution, cleaned with alcohol, electro-silvered (by means of a solution "containing cyanide of potas-"sium, the yellow ferrocyanide, a little tannin, & oxide of silver"), cleaned, heated, covered with a solution of colophony, spread over with wax, and cleaned again with cotton wadding,

The exposed parts of the steel plate are then bitten out, by making the plate (treated as above) the anode in a concentrated solution of sulphate of iron and "sal ammoniac."

"The silver and copper coatings are then removed, rubbed down," and the steel plate is exposed for a minute or two to the dissolving action of the battery "in the bath of sulphate of iron and sal am-"moniac, in order to remove the polish and lustre of the engraved "surface, so as to allow the printing ink to lay well."

[Printed, 4*d.*]

A.D. 1854, February 28.—N° 488.

SHEPARD, EDWARD CLARENCE (*a communication*).—(*Provisional Protection only.*) "Improvements in decomposing water "by electric currents."

"The invention consists in the coupling of forces which result "from the electric or electro magnetic currents with the forces "which result from the affinity or from the attraction of certain "bodies for the oxygen, for the purpose of favouring the parting "of the elements of water."

To effect this purpose a chemical preparation, having an affinity for oxygen, is introduced into the water in such quantity that it may be able to absorb all the oxygen in the water to be decomposed.

The following substances are "mixed with the water in the "proportions indicated by the tables of chemical equivalents:— "Chlorites of baryta, of lime, of cobalt, of copper, of iron, of "potassa, of soda, of magnesia. Nitrites of alumina, of am- "monia, of baryta, of lime, of cobalt, of magnesia, of iron, of "lead, of soda, of potassa. Phosphites and hypophosphites with "the same basis. Sulphites, hyposulphites, hyposulphates of "alumina, of ammonia, of baryta, of bismuth, of lime, of chrome, "of cobalt, of copper, of iron, of mercury, of molybdenum, of lead, "of potassa, of soda, of tin, of zinc. Salts of metallic protoxides, "the basis of which can reach a higher degree of oxydation, such "as the protoxyde of iron, of manganese, or others, combined "with a peroxydated acid."

One or other of the above-mentioned materials may be used according to its proximity to the works, or according to the value of the resulting product "for the arts."

[Printed, 3*d*.]

A.D. 1854, March 1.—N° 493.

GILBERT, HENRY.—(*Provisional Protection only.*) "Improve- "ments in connecting and supporting artificial teeth," in which "the electrotype process" may be used.

This is proposed to be done by the following means:—Covering "springs of steel or other suitable material which are to be "employed for connecting and supporting the upper and lower "sets of teeth, with prepared gutta percha or prepared india-

" rubber separately or combined." In some cases, applying " a thin coating of gold by the electrotype process to the exterior " of the india-rubber or gutta percha covering." Constructing " springs for the above-mentioned purpose, of steel covered by a " thin coating of gold applied by the electrotype process." Also constructing " springs for the above mentioned purpose, of solid " or tubular form, of prepared india-rubber or gutta percha " separately or combined."

[Printed, 3d.]

A.D. 1854, March 16.—N° 629.

WEARE, Robert.—" Improvements in the construction of " galvanic batteries and apparatus connected therewith."

This invention relates to " the manufacture and design " of positive and negative battery plates, " the arrangement of the " plates and the method of their insulation, and all the parts that " require to be non-conducting;" also to " raising and lowering " the plates," to " filling and emptying the cells of galvanic " batteries, and manufacturing vessels for galvanic batteries and " decomposition cells."

The Complete Specification describes the invention under the following heads:—

1st. The zinc (or positive) plate is imbedded in plaster of Paris or other porous cement; " two ears " are left out at the top, by which to attach the negative plate.

2nd. The positive plate is surrounded with a wooden frame, the frame being well coated with marine glue; the plate is then covered with porous cement on both sides.

3rd. The above-described positive plate may have merely a top and bottom marine-glued wooden piece; the pieces being wider than the cement, to allow the negative plates to be fastened to their edges, so that a space may be left between the cement and the negative plates.

4th. The two sides and bottom of the positive plate are turned up at the edges, so as to form " a framework " for the reception of the porous cement; the back is then coated " with a sufficient " non-conductor." This part of the invention is not particularly mentioned in the Provisional Specification.

5th. The positive and negative plates are fastened together at the top, and (having marine-glued brown paper between them

arranged in a wooden frame at equal distances apart. The plates are then enclosed in a porous cement, leaving a space between each pair, which is filled up with straw paper, sponge, or other suitable substance.

6th. The plates may be arranged, as described under the 5th head, with the spaces left open, "that is, without straw paper."

7th. Slips of marine-glued wood are placed round the edges of the plates, arranged as described under the 5th head, proceeding until the required number are arranged; the bottom slips of wood have holes, under which a trough is afterwards applied to fill and empty the battery. The outer sides of this arrangement are coated with marine glue, and marine-glued paper or other suitable material is bound round until the required thickness is obtained. The porous cement may then be applied to the face of the positive plates.

8th. In the arrangement described under the 7th head, the spaces are filled up with cement; a round hole is left opposite the aperture in the bottom, which is filled with sponge.

9th. The negative plates may be prepared as above described for the positive plates, where the solution requires it.

The following methods of manufacturing the vessels for galvanic batteries, &c., are set forth :—

1st. To construct a single cell, marine-glued brown paper is placed, whilst hot, round a block of a suitable size; the inside is then lined with marine glue.

2nd. For intensity batteries, single cells are joined together with marine-glued paper, and placed in a marine-glued wooden frame. The frame is made capable of being lifted by pullies or other mechanical means; its lid is air-tight, and has a pressure valve.

3rd. A "feeder" or solution-reservoir is attached to the trough described under the 7th head of arranging battery plates. This reservoir is connected with the battery cells by vulcanized India-rubber tubing, and fills or empties the battery, according to whether it is raised above it or placed beneath.

Instead of using the above-described feeder, the solution may be forced up into the cells from a "vulcanized or air-tight bag con-" tained in the reservoir below."

4th. The cells may be made "either of a square or round form," with an inverted cone projecting inwards, "similar to a safety ink-" stand."

5th. The cells are made "with non-conducting ends and "bottom," "wooden slides" are placed; the cells "are then "placed side by side, until the required number is arranged." The whole is then bound round with marine-glued paper "to the "thickness required."

6th. Manufacturing reservoirs and decomposition vessels. These are formed by covering a suitable block with marine-glued paper, or calico, &c., taking out the block, coating the interior with marine glue, and, if needful, encasing the vessel thus made with woodwork.

The 5th and 6th methods of manufacturing vessels are not particularly mentioned in the Provisional Specification.

Drawings are given of the methods of treating the battery plates. A battery, completely arranged, made according to the 7th arrangement of plates, &c., and with a "feeder" as described in the 3rd plan for making battery troughs, is also shown. Another complete battery is shown, with battery plates arranged according to the 4th, 5th, and 7th arrangements, and with the 6th plan of constructing the trough.

The Complete Specification also refers to "the employment of "elastic washers to render air-tight the holes for raising and "lowering the plates of a battery."

In fixing the porous cement to the plates, as set forth under the 4th arrangement of battery plates, "the inside of the edges" may be coated "with a sufficiently perfect non-conductor."

[Printed, 8*d*.]

A.D. 1854, March 17.—N° 642.

BASSNETT, Thomas.—(*Provisional Protection only.*) "An "improved mode of compensating for the deviation of the needle "of ships' compasses occasioned by local attraction."

The exact bearing of the ship is ascertained by a "standard "compass" on shore; then the exact bearing of the ship, as indicated by the compass on board in the binnacle, is noted; the difference between the bearing will be the amount of deviation. "Or the deviation may be obtained by reciprocal bearings. Observations of this kind should be made at every point of the "compass by swinging the ship.

"The amount of deviation having been ascertained it is care- "fully marked on a plain card, and allowance having been made

" for the deviation, the card may be divided all round into points " or degrees. For instance, supposing the standard compass on " shore indicates N. 45 E., and the binnacle compass on board " N. 30 E.," "in adjusting or correcting the compass," " N. 45 E." is marked "on the plain card at the point corre- " sponding to N. 30 E., and so on all round the card."

[Printed, 3d.]

A.D. 1854, March 18.—N° 647.

THORNE, WILLIAM.—(*Provisional Protection only.*) "Im- " provements in reducing metallic ores."

This invention consists in the use of a machine to crush, pulverize, or reduce ores containing precious metals or other minerals, and to amalgamate the same, and separate the precious metals from the less valuable metals and extraneous and earthy matters.

The machine consists of a concave vessel in the form of an annular gutter, placed and supported vertically, by means of rollers, so as to revolve round its axis. The outer periphery of the vessel carries teeth, by which it receives motion from a prime mover. The ores to be crushed are introduced at the inner and open periphery of the vessel, with two or more hollow metal balls filled with quicksilver. On the vessel being rotated, the inertia of the balls effects the crushing of the ores. If the ores are to be amalgamated, hot water and quicksilver are employed "in the " manner heretofore practised."

"An important feature in this invention" consists in discharging a current of electricity through the ores during the processes of crushing and amalgamation. The current from a galvanic battery (placed "within the open space at the centre of " the aforesaid hollow vessel") is conducted "through the ores " and quicksilver" by inserting the wires from the battery "into " the said hollow vessel until they touch the bottom thereof."

[Printed, 3d.]

A.D. 1854, March 20.—N° 658.

CHENOT, CLAUDE ADRIEN BERNARD.—"Improvements in " the manufacture of steel, iron, and different alloys, cast, welded " and moulded," consisting of certain means for effecting certain

operations "relating to the production, treatment, and use of "metallic sponges," whether natural or artificial.

This invention is comprised under the following heads:—

1st. The selection and preparation of the ores by means of an "electric sorting machine." Electro-magnets in connection with a commutator are used for this purpose. They are mounted on a rotating disc, and meet the pulverized ore upon an endless apron tangential to the series of magnets; the iron or magnetic ore is dropped at some distance from the place where the waste matter is discharged.

2nd. The reduction of ores to metallic sponge.

3rd. "The pulverization of the sponge."

4th. "The mixture of the sponge with different substances."

5th. "The compression of the sponge."

6th. Moulding spongy metals by means of compression.

7th. "Preserving the sponge from being altered before or after "compression."

8th. "The hot cementation of the compressed sponge."

9th. "The fusion and welding of compressed sponge."

10th. "A combination of the melting and cementing processes "to be carried on simultaneously."

The 6th and 10th heads are not mentioned in the Provisional Specification.

The former Patents granted to the Patentee mentioned in this Specification are N° 11,515 (Old Law), and N° 246 (1854).

[Printed, 6d.]

A.D. 1854, March 20.—N° 661.

PERKINS, Joseph.—"Improvements in metallurgy, especially "applicable to the production of type and ornamental forms."

To obtain an electrotype copy from "a type or other object" the process is as follows:—

A mould is made from the object, in gutta percha or other suitable material, in the ordinary way; it is then brushed over with plumbago, and electro-coated with metal. Instead however, of carrying on the electro-deposition until the metal is of sufficient strength and thickness to be released from the mould, a complete though thin deposit is obtained, and the back of the thin electrotype cast is filled up "with some metallic alloy, such as an alloy "of tin lead and antimony, or tin and lead, or tin and anti-

" mony, or lead and antimony, or the combinations thereof, for " which purpose the raw surface of the back of the electrotype " cast must first be wetted with a saturated solution of zinc in " hydrochloric acid, or any other equivalent solution." When a quantity of alloy has been run in, so as to form a sufficiently strong plate, the "cast is completed, and may then be detached " from the mould." "In some cases, when the cast is too heavy, " the alloy can be run out again."

If the object is made in parts, "the parts may be connected " together by heating the alloy, which then acts as solder."

In the Provisional Specification it is stated that the above-" described process can be applied "to produce a silver-faced type " or stereotype," or "silver-faced" type may be made "by simply " depositing silver on the type by the ordinary means."

[Printed, 3*d*.]

A.D. 1854, March 27.—N° 706.

ARCHEREAU, Henri Adolphe.—(*Provisional Protection only*.) "Certain improvements in treating powders of charcoal, " coke, coal, peat, and generally all matters obtained by the car-" bonization of mineral, vegetable, and animal substances, & in " applying the said powders to useful purposes."

The nature of this invention is as follows:—

" Forming from the carbonaceous substances above mentioned " a plastic material of variable consistencies, and possessing many " properties in common with gutta percha. The powder is mixed " in different proportions, according to the use of the matter, " with one or more of the following substances: coal tar or " natural 'resin of Bastenner,' residue of coal tar, pitch, resinous " & bituminous substances, gums, oils, varnishes, glues, fatty " and ceramic substances; and is then subjected to a heat which " renders the substance viscous or liquid. To obtain a substance " which can be laminated and drawn out in a moderate tempera-" ture," certain proportions of "residue of coal tar or 'natural " 'coal-tar of Bastenner,'" coal powder, and linseed oil, are mixed. "The articles made of this substance may be *galvanized*" [*electro-coated or zinced?*] "or covered with a film of metal. To " produce a harder material," the coal powder is mixed with " either talc or pulverised earth, silica, alimina" [alumina?] "or " any other substance suitable for that purpose."

[Printed, 3*d*.]

A.D. 1854, March 28.—N° 713.

ARCHEREAU, Henri Adolphe.—(*Provisional Protection only.*) "Certain improvements in galvanic batteries," consisting of:—

1st. "Rendering impervious the lower part & bottom of "the porous vessels" used in double-fluid batteries. The method preferred "is by means of the glazing which is used already "by the telegraph companies, for the upper part of the porous "cells."

2nd. "The application of a syphon, whose extremities are "bent up to the operation of filling and emptying the successive "vessels of a battery." Syphons being placed in each cell, the cells may be filled or emptied at one operation by means of another syphon in connection respectively with a vessel above or below the level of the battery cells.

3rd. A "system of filling and emptying the exterior or impervious vessels or cells by means of a hole at or near the bottom of each." The cells are placed in a trough, which can be filled with the exciting liquid to a certain depth; they have communication with the trough by means of the holes, and the liquid is supplied to the cells or emptied therefrom by means of gutta percha stoppers, attached to a common cross rod, which enter the holes.

4th. A "method of filling and emptying all the vessels of a "battery at once by the action of a pump," and without letting the obnoxious fumes escape. The battery vessels are enclosed in an air-tight box, and have separate pipes for the conveyance of the interior and exterior fluids. The fumes are led off by a pipe into a chamber for condensation. A method of filling the outer vessels by means of one pump, and the inner or porous vessels by means of another pump, is described; it consists of employing a "throttling lever," alternately shutting the sucking and forcing pipes, in connection with syphons.

5th. "Introducing the positive and negative elements of a "galvanic battery, in a sheath or case made of india-rubber or "any other suitable material." In single-fluid batteries, the fluid is conveyed between the elements "by means of an opening in the "centre of the elements." "If the battery has two liquids, they "are introduced each by a pipe passing through the elements or

" along the sheath, and opening in the proper compartment or " cell; the principle of this battery being the faculty of injecting " the exciting liquid, either periodically or continuously, at cer- " tain times through apertures or pipes passing through or along " the elements."

6th. " In obtaining dense pieces of black lead or graphite by " compressing black lead powder under the hydraulic or any " other powerful press, these pieces being used in galvanic bat- " teries in lieu of carbon."

[Printed, 3d.]

A.D. 1854, March 30.—N° 727.

JOHNSON, WILLIAM (*a communication*).—(*Provisional Protection only.*) " Improvements in galvanic, electric, and magnetic " apparatus."

" This invention relates to various arrangements and construc- " tions of galvanic, electric, and magnetic apparatus for the pur- " pose of obtaining superior effects therefrom. To this end the " combination of apparatus is made of a form approximating to " that of concave and convex lenses, or sections of them."

" In other terms, the plates composing the pile of the apparatus " are not all of the same size, the centre ones being large whilst " the poles are small, or the reverse, with the poles or ends large " and the central details small; or instead of this arrangement " one pole is made large and the other smaller. In cell batteries, " the interior cell or cells are made of a different height to the " exterior ones."

" The same general system is obviously applicable to the con- " ductors and discs of electrical machines, a difference being " established between the sizes of the centre and the ends, or " between the sizes of the poles."

" In mariner's and surveyors compasses, which are obvious " examples of applied magnetism, the same principle applies. " Instead of pointing the magnetic needle at both ends, one end " only is pointed, or the central portion is made narrow, whilst " the terminal portion is larger. The ends or centres of such " needles are treated galvanically with zinc, copper, or other metal " coatings to equilibrate the action. The boxes for the com- " passes are made of gutta percha, to insulate the instrument."

[Printed, 3d.]

A.D. 1854, March 30.—N° 731.

SANDYS, John.—" Improvements in electric telegraph instru-" ments."

A double-needle signal instrument is described and shown, with the following peculiar combination of parts:—A curved or bent magnetic needle is mounted on an axis, the axis being parallel to the core of a bar electro-magnet, so that its poles are " on either side of the end or one pole of the soft metal in-" terior" of the electro-magnet. " Hence, when a current of " electricity is passed in one or other direction, the poles of the " magnetic needle will be attracted or repelled accordingly, and " the pointer fixed to the axis will be moved in one or other " direction. The magnetic needle has a projection, which by stops " prevents the magnetic needles being moved too far in either " direction." For a core to the electro-magnet, a bundle of soft iron wires is preferred to a solid piece of metal.

[Printed, 1s. 3d.]

A.D. 1854, April 3.—N° 759.

BOBŒUF, Pierre Alexis Francisse.—(*Provisional Protection only.*) " The application of electricity and fixed or moveable " aerostation to military strategy and pyrotechny."

This invention consists :—

1st. " In the employment of fixed or moveable balloons, retained " by ropes enclosing wires for conducting electricity, and which " may be put in communication with electric telegraphs, operating " so as to obtain the instantaneous transmission of observations " or orders necessary for directing the balloon, or loosening & " inflaming the hostile matters raised by the balloon."

2nd. " In the employment of the gas used for inflating the " balloon to the projection of missiles by the means of a com-" pressing apparatus."

3rd. " In the isolated, simultaneous, and instantaneous inflam-" mation of the explosive matters used in pyrotechny by means " of the electric battery."

[Printed, 3d.]

A.D. 1854, April 3.—N° 763.

DEVINCENZI, Giuseppe.—" Improvements n producing orna-" mented and figured surfaces and surfaces for printing from, also

"the hardening or preparing of certain objects to be employed in "the process."

Amongst other applications, this invention may be used to obtain "moulds for reproducing impressions either *by the gal-"vano-plastic process* or by stereotyping."

This invention relates to producing "ornamental and figured "surfaces" on metallic and other surfaces by pressure, either of natural objects (a process called "nature printing"), or of manufactured objects and drawings.

The nature of, and method of performing this invention is as follows:—

1st. "Plates or surfaces of hard metals and alloys" are employed "for receiving by pressure sunk impressions of natural "or manufactered objects" whilst soft; they are afterwards hardened, either by an independent process, or by the compression to which they are subjected in receiving the said impressions.

2nd. Hard granular substances (such as emery) combined with varnish are employed for making designs to be reproduced as sunk impressions on metallic and other surfaces.

3rd. A hardening material is employed to harden objects which would not otherwise bear pressure. Bichloride of mercury and chloride of ammonium are used to immerse the "fleshy or other "substance" in. In some cases the substance is submitted to a dry heat until sufficiently solidified.

[Printed, 4*d*.]

A.D. 1854, April 4.—N° 770.

PARKINSON, George Seaborn.—(*Provisional Protection only*.) "Improvements in railway breaks."

This invention "consists in the construction of an electro-"magnetic break made to act on the axles of the carriages as "well as on jams or ordinary breaks, placed between every pair "of wheels where required." To a strong iron casing, clamped over the axle, is attached "a powerful double faced hook;" "out-"side the casing is fixed a wooden wheel," having its circumference "overlaid by two narrow tramways or guides of soft iron." An electro-magnet, suspended by a spring, is carried round by the tramways or guides when an electric current excites it, so as to

bring the ring of a chain attached to it into the hook. The other end of the chain is attached to a lever, which jams the breaks against the wheels. The galvanic battery is in one of the carriages of the train or on the engine, and insulated wires proceed from it along the carriages to the magnets, where shorter wires branch off. "To release the hook and break, the carriages must be moved "slightly backwards."

[Printed, 3*d.*]

A.D. 1854, April 5.—N° 779.

GILPIN, William.—(*Provisional Protection only.*) "Improve-"ments in electrical communication," consisting of:—

1st. "A new plastic material" for "insulating electric telegraph wires," "composed of certain proportions of gutta percha, pitch "or tar, rosin, & oil."

2nd. A method of "constructing subterranean electric tele-"graphs." In the first place telegraph wire is insulated and protected by means of coatings of fibrous material steeped in hot "oil, rosin, & tar;" these are formed into a rope by being covered again with tar and rosin, and the whole is pressed, while in a plastic state, into a solid body, at the same time being served by machinery with a coating of tar-soaked fibrous material. When being laid in the trench, the rope is passed through a hot compound of pitch, rosin, and sand, and is further protected by being laid in a trough, into which is poured a hot compound of pitch and rosin, a lid is then fixed on the trough.

3rd. "Insulating and protecting electric telegraph wires" by covering the rope described under the 2nd head with iron wire, and afterwards "'galvanising'" it, thus forming a "solid metallic "covering."

4th. "Constructing submarine or subterranean telegraph ropes," "by laying a core of metallic wire or wires in the centre."

5th. "An improved telegraphic alarum, in the construction of "which a delicate mechanical arrangement is introduced to assist "the escapement, so that the strong current of electricity now "ordinarily required to overcome the friction on the arm or "detention pin is not needful."

[Printed, 3*d.*]

A.D. 1854, April 6.—N° 795.

BOYD, JAMES EDWARD.—(*Provisional Protection only.*) "Im-
" provements in the construction of ships' anchors."

"This object is to be accomplished by constructing the anchor " in two or more parts, and so uniting them together with a " moveable bolt fitting into a recess or chamber loaded with " combustible matter that the bolt may be suddenly expelled or " removed by the explosion of such combustible matter, thereby " causing the parts to be disunited at their junction, and releasing " the ship from her anchorage."

"The explosion of the combustible matter is to be occasioned " by electric, galvanic, magnetic, or other agencies, to be conveyed " to the anchor by means of the ship's cable, or a chain, wire, rope, " or other appliance, either attached thereto or separate and apart " therefrom. Or the dismemberment of the anchor may be " effected without combustible matter by the employment of " mechanical agency. The several parts of the anchor, although " disunited at the junction, are still held together by means of " chains, whereby they are recovered and re-adjusted as often as " required."

[Printed, 3d.]

A.D. 1854, April 13.—N° 864.

HANSEN, EMILE WILLIAM.—" An electro-magnetic engraving " machine."

This invention consists of certain machinery by means of which designs can be copied or engraved, either upon the same scale as the original, or upon a larger or smaller scale.

The design to be copied is drawn on a metal plate by means of non-conducting ink, and the plate to be engraved may consist of certain proportions of antimony and lead. "Feelers" or tracers are made to pass over the design in a similar manner and at the same or a proportionate rate that the engraving tools pass over the plate to be engraved. Whenever the feeler passes over a non-conducting portion of the design an electric circuit is completed, which excites an electro-magnet to act upon the engraving tool by means of its lever armature. As many feelers and electro-magnets may be used as desired.

The Specification and Drawings describe and show a machine similar to a planing machine, in which a horizontal table carries the design and plate, by a reciprocating motion, respectively under the tracer and engraving tool. The electro-magnet, levers, tracer, and engraving tool are mounted upon a cross slide, and thus caused to travel a small distance transversely at the termination of every stroke of the table. Two galvanic batteries are required for every engraving tool; one to complete the circuit of the coil of a "picker" or "reversing apparatus" whenever the feeler passes over the metal, and the other to actuate the electro-magnet whenever the "picker" circuit is interrupted.

A machine upon the principle of a turning lathe is also mentioned; in this arrangement a pentagraph action enables the design to be copied on a larger or smaller scale.

Designs in relief may either be produced by a reverse arrangement of the "picker," or by a fusible metal or electrotype cast from an original engraving.

[Printed, 10*d.*]

A.D. 1854, April 13.—N° 868.

DEVINCENZI, Giuseppe.—"A method or methods of pro-
" ducing engraved, figured, and typographic surfaces for printing
" and embossing from, and for ornaments, also certain machinery
" employed therein."

The object and applications of the invention are set forth, and the various methods of carrying it into effect are elucidated in the Complete Specification under the following heads:—

1st. The object of the invention is to convert into engravings (sunken or in relief, metallic or non-metallic) typographic or lithographic prints, engravings, &c. The engraved surfaces thus obtained may be used for printing, reproducing impressions, or as ornaments.

2nd. The invention consists in producing, by means of what are called "printing machines," "prints resembling the ordinary " typographic printing."

3rd. The metals and alloys preferred to be used for printing are steel, copper, zinc, and hard alloys.

4th. "The surfaces of the metals on which the engravings are " to be produced must be polished and all grease must be " removed."

5th. Various methods of obtaining "impressions" ("with some "greasy matters") on the above-described surfaces are set forth; none of these methods involve the application of electrical force.

6th. "The greasy impressions on such metallic surfaces" being obtained, a varnish is applied to them. The varnish must be able to resist "electro-chemical action," or the simple action of an acid, and is applied by means of a cylinder ("by a process precisely "similar to that used for inking in zincography and litho-"graphy"), or a sponge may be used to apply the varnish. The varnish preferred is composed of "asphalte," essence of turpentine, and wax.

According to another process, which may be employed instead of that just described, the "impressions" may be inked with any varnish, or simply warmed and dusted over with bituminous or vitreous matter. These substances are then melted, and figured surfaces thus obtained.

7th. The metallic surfaces, thus prepared, are engraved by electro-chemical action. For steel or zinc engravings, a solution of sulphate of copper and a single cell is used. "To obtain different degrees of depth in an engraving," "the portions that are "sufficiently engraved are covered with a varnish, and the surface "is again submitted to electrical action."

8th. Other methods of obtaining engravings.

The metallic surface is covered "with a layer of another "metal by electro-plating; impressions are then produced on "this layer by the processes described under the 5th and 6th "heads;" the resulting surface is made the positive "electrode" in an electro-chemical bath; thus the super-imposed layer is removed wherever there is no impression. This surface is again electro-etched, a liquid being used that "will not attack the "metal of the layer so as to obtain engraving of greater "depth."

By another method, all such portions of the plate as have no impression are covered with a layer of a different metal; the material in which the impressions are taken is then removed, and the surface electro-etched in a liquid that does not act on the metal of the layer.

9th. "Perforated figures on sheets or leaves of metal," "for inlaid work," may be obtained by the above processes.

10th. Name plates may be produced by electro-depositing another metal in the sunken parts of an engraved plate.

11th. Engravings on metallic surfaces can also be produced by employing the above-described processes, and substituting chemical action for electro-chemical action.

12th. Engraving non-metallic bodies by simple chemical action.

13th. The impressions, obtained as above, are also used to obtain electrotype or stereotype plates.

14th. The "printing machines" alluded to under the 2nd head are described, and one worked by electro-magnetism elucidated at length. The arrangement of machinery in this apparatus is very similar to that of the composing machine and printing machine of a printing telegraph combined. The object of the machine is to produce "prints resembling the ordinary typographic printing; this is done by pressing on a button or finger key, which completes the electric circuit of an electro-magnet, thus enabling a hammer to strike the type of a type-wheel (already brought to the desired position) on to the paper at the required place. Under the finger keys a cylinder with helically-disposed studs is made to revolve; the type-wheel, being fixed to the cylinder axis, is thus brought to the desired position by the depression of a lever under the finger key; contact is at the same time made with the coil circuit of the printing electro-magnet. The paper cylinder is moved parallel to itself on the breakage of the circuit of a second electro-magnet by the depression of the finger key, thus enabling the letters to be ranged properly in line. At the end of each line a special finger key is depressed, which, by means of levers, disengages the machinery giving rectilinear motion to the paper cylinder, and rotates it axially by a click and click-wheel, so as to advance the paper for the printing of the next line.

In other machines with a small number of types mechanical means alone are used.

Sunken impressions can be produced by these printing machines on easily impressible material, from which electro-casts can be taken.

15th. Engraving on plates, and afterwards applying them to cylindrical surfaces.

16th. Electro-casts and other fac-similes can be taken from plates engraved as herein described.

17th. Engraved or perforated surfaces obtained by the above-described processes may be applied to the following purposes:—Surface printing, printing from sunken surfaces, printing fabrics, stamping metals and other materials, inlaid and marquetry work, and "for ornaments by themselves."

[Printed, 1*s*. 6*d*.]

A.D. 1854, April 17.—N° 883.

BENTLEY, William Henry.—"Improvements in cannons, "guns, and other fire-arms, and in projectiles for the same."

These fire-arms are stated to be able to "*be discharged by elec-* "*tricity*," but no method of carrying this into effect is given.

The invention relates to breech-loading fire-arms.

[Printed, 7*d*.]

A.D. 1854, April 19.—N° 904.

CLARKE, Henry.—(*Provisional Protection only*.) "Improve- "ments in cannons, guns, and other fire-arms."

"This invention is applicable alike to cannons and small arms, "and consists in constructing them with a revolving breech."

It is proposed "to discharge field-pieces and heavy guns by "electricity, conveyed along a platinum or other suitable wire "to the back of the charge, a small battery being carried with "every gun to generate the electric fluid."

[Printed, 3*d*.]

A.D. 1854, April 20.—N° 911.

REED, John Montgomery.—(*Provisional Protection only*.) "Improvements in the treatment of amalgams."

This invention consists "in the application of electricity, so as "to separate the solid metals from the mercury, and render their "extraction easy; also to purify them, and free them from dross "and scoria."

[Printed, 3*d*.]

A.D. 1854, April 24.—N° 933.

BUDDO, DAVID.—" A magnetic weather guage to give warning " of the approach of gales and storms, &c."

This invention is founded on the principle that the attractive force of magnets is temporarily increased by atmospheric currents of electricity that precede storms.

The apparatus to measure the amount of magnetic attraction of a given magnet at a given time is as follows:—

" A magnetic ring" is in two parts, one fixed, the other moveable; a screw, working in a fixed nut, is connected, by means of a moveable collar, to a spring fixed at its other end to the moveable portion of the ring. The power necessary to separate the moveable portion from the fixed portion of the magnet, by means of the screw, is indicated by the tension of the spring, which the position of the collar is made to show on " a graduated rod or " tube."

[Printed, 3*d.*]

A.D. 1854, April 27.—N° 951.

PERSON, CHARLES CLÉOPHAS.—(*Provisional Protection only.*) " Certain improvements in coating with zinc by galvanization."

This process "may be termed 'voltaic zincage by the help of " 'alumina,'" "the main point being to have a salt of zinc and " alumina present in the electrolytical solution." Certain proportions of "potassic alum" and non-hydrated "oxyd of zinc" dissolved in water are preferred. A " Brunsen's" [Bunsen's?] or Daniell's single cell is used.

"The reduction takes place on all metals now in use."

[Printed, 3*d.*]

A.D. 1854, May 2.—N° 989.

GLUKMAN, LEON.—(*Provisional Protection only.*) " Improve- " ments in effecting electric communications in railway trains and " vessels."

This invention "consists of and in the application and adapt- " ation of electricity, by means of suitable couplings, to railway

" trains and vessels, for the purpose of transmitting signals between " the various officers."

[Printed, 3*d.*]

A.D. 1854, May 5.—N° 1006.

HASELER, Edwin.—" An improvement or improvements in " ornamenting metals, papier mâché, horn, and shell."

This invention consists of the following process:—A design called a " 'negative' " is printed on the surface to be ornamented, or transferred thereto from a surface on which it has been printed; the " 'negative' " design being one in which all the parts are printed which are to be ungilded or plain in the finished article. The article is then gilt, silvered, bronzed, colored, or treated " by " acids or other chemical agents," and the " 'negative' " design removed by a suitable solvent; the design is thus left, in gold or other means of ornamentation, " on the surface to be ornamented " in all those places to which the printed impression was not " applied."

In applying this invention to metals, it may be modified *by electro-depositing* the ornamenting metal on the parts of the design not printed on, instead of applying the metal in leaf or foil in the ordinary manner.

[Printed, 4*d.*]

A.D. 1854, May 16.—N° 1088.

DERING, George Edward.—" Improvements in obtaining " motive power by electricity."

This invention consists in combining " a rolling and rocking " motion of the electro-magnets on their keepers or armatures, or *vice versâ*, " in place of a continuous rotating action or other " actions, heretofore resorted to."

A portion of a cylinder or other curve is caused by the electro-magnetic power " to roll or rock on a plane or other surface, " first in one direction and then in the other." By preference, the surface of the rocker is not in actual contact with the magnetic surface acting upon it, but is supported by independent rails, so that the surfaces approach each other as near as possible without

contact, "flanges and cogged surfaces" being "employed to keep "the rocker at all times in proper position." The motive power is derived "from the reciprocating motion of the rocker and arms "or levers attached to it."

One battery pole is in connection with one coil terminal of each electro-magnet, and the other is connected to a suitable "contact-"forming arrangement," so as to bring into action each electro-magnet in succession "immediately before" the previously acting one is thrown out.

To reverse the direction of motion of this engine, it is only necessary "to alter the position of the revolving piece, so that it "shall bring again into action the electro-magnet which was last "thrown out."

To prevent the effects of the spark, the parts exposed to its action are surrounded with a hydro-carbon or other non-oxygenated matter, or the air is excluded from them by extraction.

To regulate the supply of electricity to the engine, a tapering iron (or other imperfectly conducting) bar is more or less included in the circuit by dipping less or more into a mercury cup.

[Printed, *4d.*]

A.D. 1854, May 18.—N° 1110.

JOHNSON, John Henry (*a communication from Meinrad Theiler*).—"Improvements in printing telegraphs."

"This invention relates to an improved construction and "arrangement of mechanism for transmitting and printing "messages or dispatches by electro-magnetic agency, and consists "in the employment of wheels situated at each of the corresponding "stations, which wheels are caused to revolve at the same speed. "The difficulty which has hitherto presented itself in the employ-"ment of telegraphs based on this principle has been obviated by "the improvements herein-after described, whereby the uniformity "of movement of the wheels is required only for a very short "space of time, at the most for only half a second."

"A series of keys," with the letters marked thereon, have a revolving shaft, carrying helically-arranged tappets fitted beneath them. Each tappet is acted on by a distinct key, "the under side "of the keys being fitted with a projecting catch, which holds the

" respective tappet on the depression of the key. At the end of " the shaft is fitted another tappet (distinct from those already " mentioned), which serves to hold the shaft stationary by means " of a spring lever which hooks on to it; this lever is, however, " released, and the shaft allowed to revolve; whenever any one of " the keys are depressed, the shaft continues to revolve until the " particular tappet corresponding to that key comes in contact " with its under catch before mentioned. This has the effect of " stopping the revolution of the shaft, and establishing the electric " current through it."

"The apparatus for breaking and establishing the current " consists of an escapement wheel, which revolves upon the end " of the shaft before mentioned. This wheel is driven by clock- " work, and is insulated at the part where it turns upon the shaft, " and is fitted with a blade spring, which is attached to the side " of the escapement wheel by an insulated junction, the other end " being connected to an arm on the end of the shaft carrying the " tappets. A small stud is fitted to one side of the escapement " wheel, and the arm before mentioned is kept just out of contact " with the stud on the wheel, but when the stud and arm are " brought into contact with each other (which occurs, firstly, at " the moment a key is pressed upon, and, secondly, when the " shaft is stopped by the catch on the under side of the key), a " communication is formed and a current established; it will thus " be seen that the spring has the effect of breaking the communi- " cation between the wheel and the tappet shaft during the " rotation of the latter so long as the keys are left untouched. " The current passes through the two shafts and on to the next " station, and returns by another wire, which is attached to a piece " of copper at the other end of the key board, where is situated " the negative pole of the battery. A square piece of metal " presses upon a piece of ivory let into the copper, and is so " arranged that when the key board is at rest the metal rests upon " the ivory, and the current is broken; but the moment a key is " depressed, the metal slides off the ivory on to the copper, and " establishes a communication. Thus, as the contact between " the copper and metal arm commences before the release of the " shaft, and before the stud in the wheel before mentioned has had " time to become disconnected from the arm on the shaft, an " electric current is established for an instant merely, or during

" the striking of a key, and occurs again when one of the tappets " comes in contact with its corresponding key."

"The printing mechanism is actuated by clock-work, and an " escapement wheel, similar to the telegraph, driven at the same " speed also. The wheel containing the signs or characters in relief " is carried on the same arbre as the escapement wheel; it is kept in " contact with an inking roller, which is made hollow, and carries " the color inside. The surface of the roller is covered with " gutta percha, which is pierced with a number of very small " holes, to allow the color to ooze out. The characters on the " wheel correspond in order to the characters on the keys, and " when a key is depressed the wheel stops with that particular " character downwards, and the paper, which is cut into a long " tape or strip, is pressed against it by a lever and magnet each " time a letter is to be printed. A blank key is fitted in the " key board, to produce the spaces between the words on the " dispatch."

"In many cases it will be found necessary to employ two " printing wheels, either one or the other being actuated at " pleasure by reversing the direction of the current." The keyboard to this apparatus will be composed of two ranges of keys similar to a pianoforte. "Each set of keys acts upon a separate " rod, and each rod is fitted with the same mechanism for " establishing and breaking the current, as described above."

In the printing apparatus, one or other of the "printing wheels" is actuated, according to the direction of the line-wire current round the electro-magnets of a "pecker." In this instrument the "printing wheels" themselves are made to descend for the purpose of printing a sign. The "pecker" makes local battery contacts with one of two electro-magnets, there being one electro-magnet to each printing wheel.

[Printed, 1*s*. 6*d*.]

A.D. 1854, May 22.—N° 1132.

BALBIRNIE, Robert Anstruther (*a communication from William A. Orr*).—(*Provisional Protection only.*) " An improved " mode of mounting ships' compasses."

"The object of this invention is to destroy or neutralize the " effect of local attraction upon mariner's compasses. To this " end the compass is encased in a covering of wire gauze, which

" will attract the needle equally at all points, and yet render its
" movements visible to the steersman or other person using the
" compass."

[Printed, 3*d*.]

A.D. 1854, May 23.—N° 1145.

BIGGS, JOHN.—" An improvement in the mariners and other " compasses, and rendering them insensible to the disturbing " influence of local attraction of iron, steel, and other bodies."

This improvement consists in placing concentrically within the compass box a double ring of magnets. An "armature" is riveted "to the center of each magnet of the outer ring of mag- " nets." "The magnets are to be curved so as to exactly fit the " inside of the compass box. The inner ring of magnets are then " fitted with their poles bearing against the armatures, which, if " carefully done, they will require no other fastening to keep " them in their places; they thus form two concentric rings of " magnets. The outer ring is very carefully magnetised, and " placed in the compass box with their opposite poles toward " each other; those of the inner ring are not magnetised before " being put into their places, but become slightly so after. This " arrangement connects the magnetic current, and completely " isolates or prevents the disturbing influence of local attraction " of surrounding objects of iron, or steel, or other metalic " bodies," "on the needles."

[Printed, 5*d*.]

A.D. 1854, May 25.—N° 1162.

ASTON, EDWARD ONSLOW, and GERMAINE, GEORGE.— (*Provisional Protection only.*) " Improvements in mariners' com- " passes, to counteract the effects of local attraction," also of electricity.

The compass is placed within three or more deep copper basins, suspended one within the other with equal spaces between them; the rim of each bowl rises "to a level at the top," and the spaces between the bowls are alternately filled with any fusible non-electric substance (as "gutta percha, resin, fats, oils," &c.), and " rendered vacuous." The top openings of the basins are to be closed by means of annular plates.

[Printed, 3*d*.]

A.D. 1854, May 29.—N° 1187.

POWNALL, Charles James.—(*Provisional Protection only.*) "An improvement in communicating intelligence from one part "of a railway train to another."

This invention "consists in the employment of the ordinary "coupling chains to convey an electric current generated in any "part of a train, to work a bell, telegraph, or other suitable in-"strument, for the purpose of communicating with the engine "driver or any other person or persons in the train; the current "from the coupling chains at one end of a carriage being con-"veyed to those at the other end thereof through an insulated "wire."

[Printed, 3*d*.]

A.D. 1854, June 2.—N° 1225.

WHITEHOUSE, Edward Orange Wildman.—"Improve-"ments in effecting telegraphic communications."

This invention "relates principally to the carrying out of certain "details" of the invention secured to the Patentee by Letters Patent, dated December 12th, 1853 (See N° 2885, 1853); it also relates to the mode of adapting the said former invention to a single-wire telegraph, and to various methods of freeing the tele-graph instruments from the action of "the induced or earth "current" when subterranean or submarine wires are used.

In order to enable one line wire to take the place of several, the marks that constitute each letter or symbol are made to follow each other, instead of being arranged side by side. Instead of the electric currents being simultaneous through several wires, they are consecutive through one wire. Each letter, however, is "still the "result of a single touch, no consecutive movements of the hands "being required."

The following is a general outline of the methods pursued in this invention:—

Alternating currents generated during the continuous rapid motion of a magneto-electric machine are used; those currents that are "not intended to travel" are automatically short-circuited. A certain sequence of currents is allowed to pass along the line wires according to the key pressed down.

The magneto-electric currents, as well as those obtainable from a galvanic battery, may be directed and controlled by the aid of a

commutator; short-circuiting and other means being used. "Relays" may be employed to call into play a local battery at the distant station, and various methods of recording may be adopted.

The induced or earth current in subterranean and submarine line wires is neutralized or dispersed in three ways:—First, by the alternating currents; second, by an adjusted amount of conduction to the earth; third, by short-circuiting the current, in order to divert it from the instrument.

The receiving part of the telegraph may be made capable of recording messages from several stations simultaneously, by arranging insulated trackers side by side in connection with the respective line wires, but pressing upon the same drum.

The arrangements set forth are also applicable to more than one line wire.

The following instruments to carry out this invention are described and shown:—

"The magneto-electric decomposition printer." In the *alphabet* used in connection with this apparatus, the consecutive marks constituting each letter are made in the space between blanks; these blanks being printed by the automatic action of the apparatus, in consecutive order, as the letter marks themselves are produced. The *transmitting apparatus* consists of a series of keys and contact springs in connection with a magneto-electric machine. The alternating currents are taken direct from the machine itself to produce the letter marks, and the blanks are printed by a succession of currents in one direction (or "direct" currents) brought into action periodically, from a commutator on the armature axis, by means of a lever and cam arrangement. All the alternating currents are short-circuited until a key is pressed down; when any given letter is to be telegraphed, its key is pressed down, thus breaking certain short circuits in a certain sequence, and enabling those currents to traverse the line wire, and print at the distant station. The cam lever produces this effect by detaining the springs of those keys that have been pressed down, until an arm or "traveller" on the axis of a wheel in gear with the armature spindle passes over all the circuit pieces in a circuit wheel; those currents that have had the short circuits broken by the depression of a key or keys are transmitted, and print in the recording apparatus accordingly. The *recording apparatus* consists of a steel point, under which the prepared paper is continuously drawn "by the revolution of a wetted metal drum."

The "relay" used consists of a small horseshoe permanent magnet fixed on a spindle, "and placed between the pole pieces "or poles" of a horseshoe electro-magnet. The bend of the permanent magnet is away from the electro-magnet, and the arms of the magnets are parallel. The alternating line-wire currents passing round the electro-magnet thus complete alternating local currents; but the direct line-wire currents are not repeated, as the residual magnetism of the electro-magnet in that case keeps the local current continuous in one direction. The continuous action of the local current is not interfered with until alternating line-wire currents excite the electro-magnet.

A second "relay" is described and shown, working in a similar way to the above-described instrument, but with a bar permanent magnet between the pole pieces of two horseshoe electro-magnets.

A galvanic battery may be used instead of a magneto-electric machine in the "decomposition printer;" in this case a commutator directs and controls the currents. The "automatic needle "commutator" consists of a galvanometer needle and coil, upon the spindle of which is placed an ordinary commutator, which establishes an automatic rotation in the needle, and produces the alternation of current necessary to the working of the apparatus. This apparatus is combined with the "decomposition printer" by a wheel-and-pinion movement, as in the "magneto-electric decom-"position printer," or by a pin and star-wheel movement.

A "quantity" battery may be employed in connection with the commutator to excite secondary currents in a coil connected with the line wire. The quantity battery consists of a modification of the Maynooth battery, in which a number of cast-iron cells are included in a frame; porous cells contain the amalgamated zinc plates, and all the cells are connected for quantity, so that acids, porous cells, or zincs may be renewed without "interrupting the "proper use of the battery."

For a "long series battery," to be connected with the commutator, a great number of very small elements is used. Smee's combination is preferred, and gutta percha cells in gutta percha trays are employed. The hooks by which the trays rest upon their supporting framework are made to convey the current.

"The dial indicator and type printer." Alternating currents from the transmitting station impel a step-by-step movement at the receiving station, by means of a relay, local battery current,

and electro-magnets. On the ratchet-wheel spindle of the step-by-step movement an indicating hand and type wheel are fixed; these are rotated by the alternating currents from the relay until a key is depressed at the transmitting station; when this is done, a short circuit is established at the time that a "traveller" passes over the circuit piece corresponding to the key depressed. After indicating any letter, the hand and type wheel automatically return to zero, and during this action the recording instruments at the transmitting and receiving stations break the connection with the line wire till the return of the type wheel in each is completed, when the connection in both is re-established; thus neither instrument can work till both are ready. The recording apparatus is entirely worked by electro-magnetic power.

It is also proposed "to use a modification of the foregoing type "printer, in which a continuous forward movement of the hand "and type wheel is substituted for the above-described alternate "forward and retrograde movements." For this purpose the instrument is divested of those parts which effect the retrograde movement.

In reference to dispersing the earth current, an electro-magnet and spring armature are described and shown, that effect connection between the line and earth wires whenever the "travelling "current is drained off from the line wire," the coil of the electro-magnet being placed in the circuit of the short-circuit wire for that purpose. To obtain "infinitessimal earth contacts," platinum wires (respectively connected with the line wire and earth-plate) are welded into a glass tube containing distilled water or other fluid.

[Printed, 4s. 7d.]

A.D. 1854, June 5.—N° 1242.

LINDSAY, James Bowman.—"A means of transmitting tele-"graphic messages by means of electricity through and across a "body or bodies of water."

This invention consists of a method of completing the circuit of electric telegraphs through water, "without submarine cables or "submerged wires extending across such water," water being "the connecting and conducting medium for the electric fluid."

The two wires, respectively connected with the battery and signal instrument on one side of the water, are attached to

" metal balls, tubes, or plates placed in the water, or in moist " ground adjacent to the water." The same arrangement is placed on the other side of the water; and the forward as well as the return current passes between the respective plates.

It is preferred to place the plates on one side of the water at a greater distance apart than the distance across the water; but in case this is not practicable, the battery power must be augmented, and the size of the immersed plates increased. It is also necessary to place the plates for the forward current opposite to each other, and the plates for the return current opposite to each other.

[Printed, 6*d*.]

A.D. 1854, June 10.—Nº 1287.

PULS, FRANCIS.—(*Provisional Protection only.*) " Improve- " ments in electro-galvanic apparatus for medical purposes, parts " of which improvements are also applicable to other electro- " galvanic apparatus."

This invention refers to pocket apparatus, which " is comprised " in an oblong box of convenient size," divided into two longitudinal compartments, one of which contains the battery, and the other the conductors and induced current apparatus. The battery is " so arranged that each plate, whether of negative " or positive metal, shall be rigidly connected with the next " plate but two before (or after it, in the battery, or with the next " plate but one of the opposite quality to itself,) by an extension " of either of the plates along the side of the battery to meet the " other plate, the only exception being with the second plate from " one end of the pile, which is detached."

In an apparatus for the induced current, a plate of soft iron attached to a spring breaks contact, the electric wire being wound " over a bunch of soft iron wire." " At the place of interrup- " tion " flat or rounded plates are placed, instead of points.

[Printed, 3*d*.]

A.D. 1854, June 21.—Nº 1357.

PHYSICK, HENRY VERNON.—This invention relates to electric telegraph apparatus.

The following improvements are set forth:—

1st. " The use of more wires than one, plaited or twisted " together," " as a conductor for the electricity in submarine

"cables." In case of the breakage of any one of the wires, "the "other or others would convey the electricity."

2nd. Methods of distinguishing the separate wires from one another in submarine and subterranean cables. A strand of hemp or other suitable material is wound "spirally" [helically?] round one or more of the wires. When several cables are laid together, this method can be applied to distinguish them from one another. A difference in size, color, or material of the strands may be made, or the gutta percha may be marked or embossed.

3rd. "Useing cotton instead of hemp for the heart-worming "and sewing of telegraph ropes;" also "useing cotton or hempen "tape to bind several wires into a rope."

4th. Improvements in insulators for suspended line wires. To prevent the wire slipping through the insulator, a small hook passes through the insulator, underneath the point of support of the wire; the wire is pulled tight against the insulator by a screw and nut on the other end of the hook. In fixing the insulator to its wooden support, the upper part of it passes through the wood, and is fixed by a forked key pushed through a groove, or a split key driven through a hole. When the insulator is fastened sideways to the post, a hoop-iron clip, with a bolt and nut, tightens the insulator, and allows for various sizes.

[Printed, 7*d.*]

A.D. 1854, June 22,—N° 1369.

BLASHFIELD, JOHN MARRIOTT.—"Improvements in the "manufacture of china, pottery, bricks, and other articles manu- "factured for the most part of clay."

This invention consists of "the use of minerals or fossils "containing phosphate of lime, and known in commerce as "'coprolites,' 'phosphorites,' 'fossil sponges,' 'fossil fœces,' "'fossil flesh,' and 'fossil bones,'" in the manufacture of the above-mentioned articles.

The fossils are washed, dried, and pulverized by processes that are described.

To separate particles of iron, they are then passed between or near the poles of small electro-magnets, or the thin layer of fossils is raked over "with a suitable combination of small electro-magnets."

[Printed, 4*d.*]

A.D. 1854, June 27.—N° 1412.

SMITH, ANDREW.—" Certain improvements in the manufacture " of certain kinds or descriptions of wire and other ropes and " strands."

The object of this invention is to form "strands for 'formed " ropes,'" [electric?] "telegraph and other cables, without putting " individual twist into the wires or yarns composing such 'formed' " strand."

Any suitable means may be employed to carry out this invention, but the method preferred is as follows :—

The required number of bobbins, carrying the strands, are mounted on a horizontal "bottom frame plate," which revolves on a step that is cored out "to allow of the passage through it of " the centre wire core or heart." From the bobbins the strands proceed to a "nipper tube or laying plate," where they are united and laid on to the core or heart. The strand, thus formed, passes over a sheave to a coned pulley driven by a screw on the driving shaft working into a screw wheel.

In order to hold the bobbins "in the same relative position, or " what is known as 'always presenting to view the same face' " during their revolution," they are hung in separate carriage frames or forks, whose axes are cranked, and rest in the "bottom " frame plate;" an excentric on the axis of the apparatus gives suitable motion to an "upper plate" carrying the crank pins, thus effecting the desired object.

It is proposed to lay up "formed strand," by means of this apparatus, " of hard or unannealed wires."

[Printed, 11*d.*]

A.D. 1854, July 4.—N° 1471.

JOHNSON, JOHN HENRY (*a communication from Edmond Charles Bocquet*).—(*Provisional Protection only.*) "An improved " system or mode of coating iron with copper."

The following process is described :—

The articles are cleansed and prepared for electro-coating by immersion in dilute sulphuric acid; they are then washed with water, immersed for a few moments in boiling water, plunged into a lye of caustic soda, and submitted to the action of lime by remaining in it for several weeks.

"A thin preservative coating" of copper is then given, by means of "a solution of cyanate of potassium and cyanate of "copper in water, sufficient to produce complete saturation."

The articles are then washed in water connected with an "electric battery," and left for some hours in a heated solution of acid sulphate of copper, by this means acquiring a thick and firmly-adhering coating of copper.

A coating of lead may be substituted for the first preservative layer of copper. A solution of "oxide of lead (litharge) dissolved "in water which holds in solution ten per cent. of potash," is used.

[Printed, 3*d.*]

A.D. 1854, July 6.—N° 1488.

JOHNSON, John Henry (*a communication from Thomas C. Avery*).—(*Provisional Protection only.*) "Improvements in electro-"magnetic engines."

This invention refers to a "'magnetic multiplying motive power "'engine,'" and consists of the following arrangement:—

"Four or more electro-magnets are combined in pairs, so as to "present their poles towards a common centre, leaving space "between the poles to admit an axis." The magnets act upon "levers" attached to the axis, "and between each two of these "levers the ends or legs of the magnets are allowed to pass." "Palls and cams" suitably make and break the circuit, and thus continuous rotation of the axis is obtained. The principal features of the invention are the above arrangements of electro-magnets and "revolving bars," "the helices being upon the bends of the "magnets." "The current of magnetism and electricity is also "combined in such manner that the power obtained is due to the "size of, or bears a relation to, the mass of iron under excite-"ment."

[Printed, 3*d.*]

A.D. 1854, July 7.—N° 1494.

MORISON, Andrew.—(*Provisional Protection only.*) "An "improved mode of protecting or preserving agricultural and "horticultural produce from disease or blight."

This invention "consists in placing metal bars, rods, or wires "in the ground in such situations as may be suitable for at-

" tracting the electricity of the atmosphere and carrying it into " the earth, and thereby preventing the ordinary effects produced " by it upon plants and crops exposed to its influence in fields " and gardens, more especially in open situations. These bars, " rods, or wires may be composed of copper, iron, steel, brass, or " other metal, and they may be placed in the ground vertically, " horizontally, or obliquely, according to the disposal of the " plants or crops requiring to be protected by them."

[Printed, 3*d*.]

A.D. 1854, July 15.—N° 1557.

GUYARD, FRANÇOIS VICTOR.—(*Provisional Protection only.*) " Certain improvements in the electro-telegraphic communications " for preventing mischances during the passage of trains on rail- " ways."

Two insulated wires are laid down, in separate and insulated lengths, along a line of railway near the rails, so that the spaces between the lengths of one wire "are opposite to the middle " of the adjoining length of the other wire." Each train carries a galvanic battery having one of its poles in connection with an alarum and with the insulated wires; the other battery pole is in connection with the earth by means of one of the axles. If one train comes on to the same length of one of the insulated wires as a second train, it completes the circuit of its own battery and alarum to the earth as well as that of the battery and alarum of the second train, thereby giving and receiving intelligence of its proximity to the second train.

The connection of the battery on a train with the insulated wire is effected by means of revolving cylindrical metallic brushes.

To prevent the possibility of the batteries on the two trains neutralizing each other, an apparatus in the circuit constantly reverses the connections.

Telegraphic communication may be established between two trains not further apart than "one-half of the length of a section " of wire."

The same apparatus is applicable to giving notice of obstructions on the line, or of the opening of gates used at level crossings. " A similar arrangement is applicable to a swing bridge."

[Printed, 3*d*.]

A.D. 1854, July 15.—N° 1563.

WAGSTAFFE, Matthew French, and PERKINS, John William.—"Improvements in obtaining metals from ores and "oxides."

The ores or oxides are acted upon by various mineral acids in connection with voltaic electricity, "so as to dissolve out and "disintegrate from the matrix each metal contained therein in "succession, in accordance with their respective degrees of solu- "bility in such acids respectively;" the metals "are obtained "direct," or are afterwards precipitated from their solutions by voltaic electricity. The residual acid solutions are neutralized by fixed alkalies; thus neutral salts of the alkalies are obtained "in a "commercial state."

The following processes are described:—

1st. Breaking "metallic rock into coarse powder," and dissolving out the metallic oxides by "the action of sulphuric acid, "nitric acid, hydrochloric acid, or mixture thereof."

2nd. "Breaking or crushing the sulphurets of metals, and "roasting at a red heat in a common reverberatory furnace, "drawing therefrom into the respective acids in a red hot state," to reduce the metals speedily "to a solution." Carbonate of soda or potash may be used to precipitate the metals as carbonates; the remaining solutions of neutral salts ("as nitrates of soda or "potash, &c.") may be applied "to commercial purposes."

3rd. "The conversion of carbonates of metals into commercial "articles by the ordinary modes of purification, or the further "solution of such carbonates in their respective solutions, and "depositing the same in a metallic state by the ordinary processes "of electro-metallurgy."

[Printed, 3*d*.]

A.D. 1854, July 18.—N° 1575.

ARCHER, Charles Maybury.—(*Provisional Protection only.*) "Treating all kinds of paper whereon any printing, engraving, "engrossing, letter writing, or lithographing has been printed or "impressed, so that the said printing, engraving, engrossing, "letter writing, or lithographing may be completely removed, "discharged, or obliterated from the said paper, & so that the "said paper may be readily re-used in sheets, or be re-converted

" & worked up again into its primitive pulp by the ordinary " method, & be again manufactured into & be used as paper."

The residual products of the process herein-after described " (other than the pulp and paper so treated)," are to be used, among other purposes, "*for electric telegraphic battery purposes.*"

Any of the above-mentioned descriptions of paper is immersed " for a given period in a bath or solution of pure sulphuric or " other acid," by which means the printers' ink is discharged from the paper. To prevent the destructive influence of the acids upon the paper, it is, during the process of elimination of the printers' ink, plunged into spring water, or into hot water for a short period. A soft brush may be passed over both sides of the paper, "so as to enable it (after being, if necessary, bleached), by " immersion in spirits of ammonia or other alkali, to present an " almost normally clean surface for being (after the application " of pressure to take out the stamp of the types) used again in " printing, engraving, engrossing, or lithographing."

[Printed, 3*d*.]

A.D. 1854, July 18.—N° 1582.

FONTAINEMOREAU, Peter Armand le Comte de (*a communication*).—(*Provisional Protection only*.) "Improvements in " zincography."

The design is drawn on the roughened zinc plate in lithographic ink; the zinc plate is then "slightly heated," and has a powder or insulating mixture, composed of " resin, Burgundy pitch, " and asphaltum," dusted over it. The superfluous powder is then removed, "so that the drawing alone is coated with the " above mixture," and the plate heated to soften the adhering powder, and "convert it into a varnish similar to that employed " by engravers for stopping out."

The plate is then "placed in a weak solution of sulphate of " zinc," and etched by galvanic means.

"When the drawing is sufficiently bitten in, the plate is " removed and cleansed. It may then be employed to print from " directly, or to serve as matrix to a gutta percha mould, on " which copper is subsequently deposited, to form a picture " according to the well-known galvano-plastic process."

[Printed, 3*d*.]

A.D. 1854, July 21.—N° 1605.

ALEXANDRE, Isaie, and SOMMERVILLE, Alfred.—(*Provisional Protection only.*) "An improvement or improve-" ments in boots and shoes, and in socks or inner soles for boots "and shoes."

This invention "consists in applying to the interior of the "bottoms of boots and shoes, wires or plates of copper and zinc, "or combinations of such other metals or materials as will form "with the moisture of the foot galvanic or voltaic combinations. "The electricity generated during the wearing of boots and shoes "made according to" this "invention gives vigour to the nervous "system of weakly or debilitated persons. Where socks or move-"able inner soles are worn in boots and shoes," "the said voltaic "or galvanic combinations" are applied "to the said socks or "soles."

[Printed, 3*d.*]

A.D. 1854, July 21.—N° 1606.

CALLAN, Nicholas.—"A means by which iron of every kind "may be protected against the action of the weather, and of "various corroding substances, so that iron thus protected will "answer for roofing, for cisterns, baths, gutters, window frames," [*electric?*] "*telegraphic wires*, for marine and various other pur-"poses, and by which brass and copper may be similarly protected."

This invention consists in coating iron, brass, or copper with the following alloys:—

1st. "Of lead and tin, in which the quantity of lead is at least "twice or three times as great by weight as that of tin."

2nd. "Of lead, tin, zinc, and antimony."

3rd. "Of tin and antimony."

4th. "Of tin with any two of the other three metals.'

Iron, copper, or brass may be coated "with any of the above-"mentioned alloys by first coating them with tin," or with an alloy of tin in which the quantity of the above-mentioned metals is small compared with that of tin, and then dipping the coated metal "into the molten lead or antimony," or into any of the aforesaid molten alloys.

"Or, after being properly cleaned and prepared, iron, brass, and "copper may be coated at once, by dipping them into any of the "said alloys, whilst these alloys are in a liquid state."

In general the quantity of lead should be much greater than that of tin, and the quantity of zinc or antimony should not exceed that of tin. In cases where great resistance to corrosion is required, the quantity of antimony may be equal to or greater than that of lead, the quantity of lead being "diminished in proportion "to the increase of that of antimony."

[Printed, 3d.]

A.D. 1854, July 28.—N° 1665.

JOHNSON, Richard.—"Improvements in coating and insu-"lating wire" "employed to conduct the electric or electro-mag-"netic fluids."

This invention consists in "coating or covering wire with "solutions of gutta percha, caoutchouc, tar, pitch, asphaltum, "resin, or wax in coal naptha, or in any other suitable fluid."

Gutta percha is dissolved by placing certain proportions of coal naptha and gutta percha into a steam-heated pan, and setting in motion in the liquid an agitator that passes through a cover.

Caoutchouc is dissolved (in a cast-iron pan heated over an open fire) by means of heavy oil of tar; when this becomes a thick homogeneous mass, it is mixed with a certain quantity of coal naptha, and introduced into the steam-heated pan.

Coal tar is dissolved in a certain proportion of coal naptha at the ordinary temperature.

To coat wire, it is passed from a reel into a solution composed of certain proportions of the above-mentioned solutions, then through a small aperture to remove the superfluous quantity; the naptha is then ignited, and the wire passed into water and reeled upon reels; or a bundle of wire may be dipped into any of the above solutions, and the volatile fluids evaporated by artificial heat; or the volatile fluids "adhering to the bundle" may be ignited, and the wire then exposed for several hours to the atmosphere, and plunged into cold water.

[Printed, 3d.]

A.D. 1854, July 29.—N° 1670.

KEEN, Robert John.—"Improvements in the mariner's com-"pass."

This invention "is intended to counteract the effect of the

" pitching and rolling of vessels, and the vibrating action in " steam vessels," and consists :—

1st. " In adapting a peculiar construction of india-rubber disc " spring to the cap of the compass."

2nd. " In adapting a double action metallic spring to the centre, on which the compass card is supported."

3rd. " In adapting metal springs to the pivots and shoulders of " the compass."

A binnacle compass is described and shown, attached to the binnacle by a half gimbal which " forms the springs for the pivots " and shoulders of the compass, the ends being left free, so as to " be capable of yielding to any lateral motion." The compass bowl, preferably of glass, porcelain, earthenware, or other non-metallic material, is suspended on pivots in a gimbal supported in the half gimbal. The centre "pedestal" supporting the compass card carries a metal cup, in which a disc of vulcanized India-rubber is fixed by a screwed ring; ivory or bone washers are cemented to the disc, so as to prevent it from coming in contact with metal; and the jewelled cap, for the steel centre of the card to work in, is mounted in a similar way in the centre of the disc; thus the India-rubber is preserved from the corrosive action of metal. The steel centre of the card is fixed to a metal disc which is placed, free to move, in a cylindrical box between two coiled springs; the box being fixed to the bridge of the card. The compass card has two parallel needles.

A cabin compass is shown, having the 1st and 2nd improvements; its card carries two parallel dipping needles.

[Printed, 9*d*.]

A.D. 1854, July 29.—N° 1679.

BELLFORD, AUGUSTE EDOUARD LORADOUX (*a communication*).—" An improved method of engraving."

" This invention consists in producing engravings of all kinds " in relievo by a galvanic current, the plate or metallic object " desired to be engraved being covered with the design in some " suitable ink, and substituted for the soluble or feeding electrode " usually employed in any pile whatever."

The following are the processes by which this invention is carried out in practice :—

Preparing the plates.—It is preferred "to impart to the surface " a certain dulness, as the lines are liable to widen out on a per- " fectly bright or polished surface." This is effected by strewing pumice-stone powder on the plate, moistening it with water, and rolling a small zinc roller "over the plate in all directions until " the required shade be obtained," or " brown oxyd or peroxyde " of lead diluted with water" may be passed over the plate.

Drawing the design.—Lithographic ink, or varnish insoluble in water, may be used. If lithographic ink is used, it may be rendered insoluble in water by diluting with albuminous water, and exposing the plate drawn upon with this ink to a temperature of 212° Fahrenheit, thus coagulating the albumen. When the drawing is made with ordinary lithographic ink, or with a lithographic pencil, or when it is taken off a drawing, the plate is " acidulated" by a suitably dilute solution of nutgalls and nitric acid. The plate is then washed, gummed, the drawing removed by essence of turpentine, and the plate again washed in gum water, and inked with a composition of yellow bees'-wax, essence of turpentine, linseed oil, lampblack, tallow, gum lac, "colophany," Burgundy pitch, and white pitch.

Engraving the design.—The engraving bath is composed of soluble salts of the metal or metals of which the plate is composed. The drawing having been made as above described, is covered at the back with wax or protecting varnish, and placed in the engraving bath, in contact with the positive pole of a suitable battery, opposite a negative pole. It is taken out of the bath after a short time, and the fine lines caused to merge into one another by inking with the "cero-resinous ink" above described, and subjecting it to a gentle heat, so as to cause the ink to run down the edges of the lines and fill up the gaps in the lines; the plate is again placed in the etching bath, and the operation of inking and etching alternately carried on until there only remain the great blanks to be hollowed out; these are deepened by covering the line or dark parts of the drawing with ink, and corroding the blanks to the depth required.

This invention may be applied "to making calico printing " blocks."

[Printed, 4d.]

A.D. 1854, August 4.—N° 1713.

KORTRIGHT, Alfred.—" Improvements in marine and sur-" veying compasses."

This invention relates to so arranging mariners' and surveyors' compasses as to neutralize the effects of the local attraction of iron or steel.

" In this improved arrangement the needle and index card case " is of cast iron. It is a plain and truly-turned ring, open at the " top in the usual manner, and closed in at the bottom by a glass " or other plate, so as to form a box. In addition to this cast-" iron case, rings of external cases of the same metal may be dis-" posed outside it, so as to produce a still greater protective effect " upon the needle."

" It is preferred to use both light and heavy needle cards," and " to make them with two dipping needles."

" The cast-iron rings or cases may be *electrotyped.*"

[Printed, 3*d.*]

A.D. 1854, August 4.—N° 1714.

HARRISON, Charles Weightman.—" Improvements in ob-" taining and applying electric currents, and in the treatment of " certain products derived in obtaining the same, part or parts of " which improvements is or are applicable to the production of " motive power."

This invention relates to galvanic batteries, electro-magnetic engines, and the manufacture of coloring matter or pigments from battery solutions.

1st. Improvements in galvanic batteries.

An "amalgam," "compound," or alloy of sodium, zinc, and mercury is used for positive "electrodes" or elements of batteries; this alloy is made in a crucible by the application of heat. Potassium may be used instead of sodium, and either potassium or sodium may be used with any other metal to serve as a positive " electrode."

Instead of amalgamating zinc plates in the ordinary way, it is preferred to unite the zinc and mercury by melting them together in a crucible, the mercury being added in small quantities at a time through a funnel.

An alloy of platinum and iron, made by heating the metals together in a covered crucible, is used as a negative "electrode,"

Zig-zag negative "electrodes," with the bends divided to within a short distance of one or both ends, are used; or sheets of metal may be divided into "numerous bars or segments."

Euchlorine or "hypochlorous acid" is added in solution to the ordinary excitants or electrolytes, to act "either as an exciting or "secondary agent," or as both. The euchlorine solution is prepared by gently heating certain proportions of "chlorate of potassa" and hydrochloric acid, and passing the resulting gas through water to saturation.

A battery solution for single-fluid arrangements is composed of equal parts of nitrous acid and water; this may be used with or without the euchlorine solution.

A battery is formed of "cylinders or plates bent in a cylindrical "form, and placed around each other in a concentric manner. "Each of the positive plates is formed of a like quantity of "metal, and they are therefore progressively thicker as their sizes "diminish." Two negative plates, attached to and separated from each other by gutta percha, intervene between the positive plates; and the pair of negative plates surrounding each positive plate "are united to operate as one plate." "Muriate of ammonia" solution is used to excite this battery.

Diaphragms of "asbestos or other incombustible amphibolite" [amphibiolite?] "mineral" are used; the material is for this purpose manufactured into sheets by analogous processes to those of paper making.

2nd. Improvements in electro-magnetic engines.

"Square or rectangular wires or ribbons, disposed in bundles "of several separately uninsulated single wires," are wound "closely around the poles of electro-magnets." This improvemay also be used "in the construction of electro-magnets for all "purposes, and coils for telegraphs."

An arrangement of an electro-magnet, called "the plate horse-"shoe electro-magnet," is employed in electro-magnetic engines. These magnets are made of drawn quarter-inch plates of decarbonized soft iron; they are cut to the required size, and bent "along the middle across the direction in which they have been "drawn to the shape of an ordinary horse-shoe magnet, and until "the flat arms are about one-third of an inch distant from each "other, the edges of the plates forming extended narrow poles." The peculiarities of these magnets mainly consist "in this great

"length of poles, and in their large and comparatively thin "rectangular arms."

Two "reciprocatory" electro-magnetic engines, in which the above-described electro-magnets are used, are described and shown. In one engine, a beam, carrying keepers consisting of flat plates, is made to vibrate on an axis between the poles of the electro-magnets. The electro-magnets are "fixed by any suitable means "in an inclined position, so that the faces of their poles at one "end approach close to the ends of the keepers nearest the axis;" "whilst their other ends are separated to a distance from each "other, and thus afford space for the keepers to vibrate between, "according to the length of stroke required." The greater length of the keepers and magnets on one side of the axis is compensated by the greater number of them on the other side. The electric current is so supplied to and cut off from the coils of the electro-magnets that the keepers may vibrate between the magnets, and give motion to a connecting rod and crank on the driving shaft. In the second engine, there are only keepers and electro-magnets on one side of the axis of vibration, but there are several series of electro-magnets and keepers, each series having its own axis of vibration. A rod passes over all the keepers parallel to their plane of motion, and is suitably connected to them; one series moves the keeper of the next series into its sphere of action, and so on until the rod is moved a sufficient length to form a stroke. The rod gives motion to the driving fly-wheel shaft by means of a connecting rod and crank. Having made one stroke, the action is reversed. The electric current is made to excite the right or left hand magnets of each set, in succession, by means of a suitable "electrotome" or commutator.

A rotary electro-magnetic engine, having the above-described electro-magnets, is described and shown. The electro-magnets are fixed to two discs, with their poles facing a central shaft, and arranged cylindrically. On the shaft "triangularly-formed "keepers" are supported "with one of their flat sides closely "approaching the faces of the magnets." On the magnets being excited (by "electrotomes" or commutators) in advance of the keepers, the shaft is caused to rotate. The electro-magnets have rounded poles (quadrants in section) tangential to the flat side of the keeper when it is opposed to the poles.

3rd. Improvements in the manufacture of coloring matter or pigments from battery solutions.

Yellow.—A strong solution of chromic acid is added to oxide of zinc suspended in boiling water; the liquid mass is then boiled, stirred, and stood to cool in pans. The supernatant liquor is then poured off, and the subsided matter heated; it is then ready for use. The zinc oxide is obtained by decomposing the galvanic salts by an alkali, and then exposing them to a red heat.

Red.—" The bright chrome yellow solution above described" is mixed "with carbonate of lead and chromic acid in like propor-" tions." The mixture is boiled and stirred in lime water, and then dried ready for use.

Blue.—To produce a dark blue, the mixed peroxide and protoxide salts of iron in solution are added to " a solution of ferro-" cyanic acid, with sufficient potassa to neutralize." The blue coloring matter is then precipitated by hydrochloric acid. Lighter shades of blue are obtained by adding in various proportions a salt of zinc to the iron salts.

Green.—Certain proportions of the solutions of sulphate of zinc, sulphuric acid, oxide of chromium, and sulphate of cobalt are mixed together; the oxides are then precipitated by an alkali, and the mass dried and exposed to an intense heat "until it assumes " a rich green color."

Brown.—According to the shade required, "different propor-" tions of the galvanic solutions of iron and zinc" are mixed, evaporated, and calcined.

White.—" A galvanic solution of the muriate of zinc" is boiled in lime water until its oxide is precipitated; it is then dried and calcined.

[Printed, 11*d.*]

A.D. 1854, August 26.—N° 1875.

BROOMAN, Richard Archibald (*a communication*).—" Improvements in obtaining motive power."

This invention relates to "obtaining motive power from the " force of gravity;" also to obtaining motive power "from the " combined forces of gravity and electro-magnetism."

In obtaining motive power by gravity, two wheels placed vertically side by side upon separate axes, "are made to act

"alternately upon each other, so as to keep up a continuous "motion." For this purpose each wheel is "weighted for about "one-sixth of its circumference," the weighted part of one wheel, when in a vertical line with its centre, being opposite to the weighted part of the other. "When one wheel has performed "half of its revolution by gravity, a projecting arm takes into a "corresponding projection or other suitable mechanical con- "trivance in the other wheel, and is carried up by the descent of "the first, and so on, until the apparatus is stopped."

To regulate, quicken, or slacken the speed of the wheels, "a set "of semicircular" [a semicircular set of?] "electro-magnets" is placed over one or both of the wheels; these act either by attraction or repulsion, as may be required, and are excited in proper order by suitable "breaks and springs."

Instead of having a second wheel, the heavy part of one wheel may be raised through half a revolution by a semicircular set of electro-magnets, excited successively by suitable "breaks and "springs."

[Printed, 7*d.*]

A.D. 1854, August 28.—N° 1884.

GRAY, John.—"Improvements in the mariner's compass."

The object of this invention is to "counteract the vibratory action "to which they are subject in steam ships and other vessels."

"The compass is suspended within a vessel or bowl, which "is held in a state of suspension within another vessel or bowl "containing fluid," preferably varnish or saturated solution of common salt, the bottom of the inner bowl being connected with that of the outer bowl by helical springs. The inner vessel is kept in a central position by tension screws, fixed to the outer vessel, acting on India-rubber bands attached at their centres to lugs on the inner vessel.

The needle and card are supported so as still further to decrease vibration. The spindle or pedestal carrying the card passes into a box containing a "spiral" [helical?] spring, which bears against a disc fixed to the spindle, so as to counterpoise its weight in some measure; the spindle passes through this box into one beneath it, its foot there resting on the centre of a vulcanized India-rubber disc supported by its circumference. On the top of the spindle is another box, carrying similarly another India-rubber

disc, in the centre of which the "cup" "(which receives the pin " of the compass card) is fixed." Round the cup is stretched a ring of vulcanized India-rubber, to prevent it from jarring against the cover of the box. The compass card has, by preference, two parallel needles mounted on centres, and carries plates of talc, which, by offering a resistance to the air, check the oscillations of the compass. A pin descends from the centre of the glass cover, nearly into a cup on the bridge of the card, "to prevent the card " being thrown out of its bearing by a sudden shock."

[Printed, 9*d*.]

A.D. 1854, September 2.—N° 1920.

CALLAN, Nicholas.—" Improvements in certain galvanic bat- " teries," consisting of:—

1st. The use, in single-fluid batteries, of "certain proportions " of sulphuric and muriatic acid with water, either separately or " together, and mixed or not mixed with an alkaline or metallic " salt." The salts mentioned are sulphate of iron, chloride of sodium, "carbonate, sulphate, or phosphate of soda, or perman- " ganate or arseniate of potash." "The addition of these salts " serves to keep the surface of the zinc clean." The arrangement preferred, where "great galvanic power is required," is cast-iron, " sulphuric acid mixed with three times its bulk of a strong " solution of common salt," and amalgamated zinc; this arrange- ment is called "the Maynooth single fluid battery."

2nd. " The use of iron or cast iron instead of the copper used " in Daniell's battery, and in other similar constant batteries."

3rd. " The use of sulphate of iron instead of the sulphate of " copper used in Daniell's battery and similar constant batteries." It is proposed to use the 2nd and 3rd improvements in combination with each other.

4th. " Using for the positive element of certain galvanic bat- " teries zinc coated with an amalgam of mercury, tin, and lead, " or with an amalgam of mercury and either of the other two " metals."

[Printed, 4*d*.]

A.D. 1854, September 8.—N° 1960.

PETITJEAN, Tony.—" An improved process for re-cutting or " re-forming the faces of files."

The worn files are connected to the positive pole of a galvanic battery, and placed "in a bath of a pure solution of iron." The dissolving action "first takes place in the hollows," and their cutting edges, after a short interval, "resume their original relative projection and sharpness."

The method of carrying out this invention is as follows:—

The files are placed in a large cylindrical vessel (lined inside with a "metallic brush" connected to the negative pole of the battery) against wire circles connected to the positive battery pole. The distance between the battery poles should not be "too small." "The electric current should be very strong, else the temper of the files might soften."

[Printed, 3*d*.]

A.D. 1854, September 11.—N° 1980.

SZONTAGH, SAMUEL.—"Improvements in sewing machines."

This invention relates to shuttle sewing machines, and consists:—

1st. In employing a flat and broad pointed needle for sewing leather.

2nd. In "the application of a magnet to the shuttle box of sewing machines for keeping the shuttle in close contact with that part of the shuttle box against which it slides." "The passing of the thread or other sewing material *over* the shuttle, instead of *between* it and that part of the shuttle box against which it slides," is thus ensured. The needle is protected "from being acted upon by magnetic attraction by affixing a piece of brass to that part of the shuttle box at which the needle passes." The shuttle is preferably formed of "iron, combined with a newly-invented preparation of india-rubber known as 'protean,'" which does not cut the thread. The outer surface of the shuttle is convex, and "the inner or contact surface flat." A horseshoe permanent magnet is shown in the Drawings, its poles being applied to the shuttle race.

[Printed, 6*d*.]

A.D. 1854, September 13.—N° 1990.

BELLFORD, AUGUSTE EDOUARD LORADOUX (*a communication*).—"Improvements in electro-magnetic clocks."

The peculiarities of the electric clock described and shown are, that the vibrations of the pendulum "are kept up by an escape-

" ment of constant strength," and are thus independent of the battery power used, and that each clock is worked by an independent mechanism.

The lever armature of an electro-magnet is alternately acted upon by a reaction spring and by magnetic attraction, the electric current being made and broken by the pendulum striking against a spring. A click on the lever arm works into the teeth of a ratchet wheel loose on the escape-wheel axis, but connected with it by a spiral spring; the click is moved so as to wind up the spiral spring by a constant force, viz., that of the reaction spring, the electro-magnetic power being only used to draw back the click ready for taking into the next ratchet tooth.

The power thus continually called into action by the winding up of the spiral spring is conveyed to the hands of the clock by suitable wheelwork.

A striking clock is described and shown, in which a similar arrangement of click and wheelwork, connected with the usual striking mechanism, is acted upon by the armature lever; by this means the remontoir is being continually wound up.

[Printed, 10*d.*]

A.D. 1854, October 2.—N° 2111.

DURAND, François.—(*Provisional Protection only.*) " Certain " improvements in looms for weaving."

The Drawing left with the Provisional Specification shows " horse-shoe magnets," supported by the shafts so as to act upon small plates of steel fixed to the under side of the shuttles.

[Printed, 6*d.*]

A.D. 1854, October 3.—N° 2122.

NEWTON, William Edward (*a communication from Laurentius Mathias Eiler*).—This invention is entitled " Improvements " in the construction of locks," and it relates to " the magnetic " lock."

This name is given to a lock in which there is no key or keyhole, or any " opening whereby access may be obtained to the interior of the lock with any instrument whatever;" but the bolt is shot forward, and fastened by means of " a powerful magnet." In order to fix the bolt after it is shot forward, there are slides working in grooves, the slides being of iron, and so connected

that until all the slides are moved back in a certain order the bolt is not free.

For this purpose the grooves are made to meet at an angle, and the slides of the grooves further removed from the bolt to enter those nearer to the bolt in succession; each slide is fixed, therefore, until the first in the series, and all further removed from the bolt than itself, is moved back in its groove. The possessor of the lock has a plan of the grooves, by which he is enabled to act properly on the slides from the outside by means of the magnet.

One or more "permutation plates" may be used where great security is required, these change the combination of the internal parts with facility.

[Printed, 10*d*.]

A.D. 1854, October 14.—N° 2198.

HJORTH, SÖREN.—(*Provisional Protection only.*) "An improved "magneto-electric battery."

A magneto-electric machine is described and shown having the following peculiarities:—

The coiled armatures revolve between the poles of fixed cast-iron permanent magnets and of fixed "electro-magnets," and thus generate electric currents in the armature coils, which are allowed to pass round the "electro-magnets;" "a mutual and accelerating "force" is produced by this means between the "electro-"magnets" and the armatures. "An additional or secondary "current is at the same time induced in the coiling of the electro-"magnets by the motion of the armatures, the said current "flowing in the same direction as that of the primary current "after having passed the commutator."

The commutator consists of an arrangement of inlaid segments and rings (each ring being connected with opposite segments) fixed on to the armature axis. Springs, forming the poles of the apparatus, press upon the segments, and supply an electric current in one direction.

"False poles" are "applied on the ends of the permanent and "electro-magnets." These consist of iron plates having sharp edges "exposed to the points of attractions of the armatures, while "sharp points of different lengths are exposed to the points of "separation, and the edges extending from the said sharp points "are chamfered off towards the points of attraction, the latter

" having the same length." Corresponding iron plates are applied on the ends of the armatures.

The poles of the permanent and electro-magnets on the one side of the revolving armatures are all north, and those on the other side all south.

The permanent magnets may be coiled like the electro-magnets.

The Drawings of the next Patent (N° 2199) are referred to, and show this "battery" in connection with an improved " electro-magnetic engine, which the battery is well adapted for " driving."

[Printed, 6d.]

A.D. 1854, October 14.—N° 2199.

HJORTH, SÖREN.—(*Provisional Protection only.*) " An im-" proved electro-magnetic machine."

A reciprocating electro-magnetic engine, in connection with the " magneto-electric battery" set forth in N° 2198, is described and shown.

The "cylinder" is hollow, and allows the "piston" to pass completely through it. The cylinder is composed of "several hollow " stationary electro-magnets," "conical inside, with double poles " placed in opposite directions, in order to serve for double " strokes." The "piston" consists of "a hollow electro-magnet," " put together in such a manner that its single parts terminate " into an iron ring."

The electric current proceeds round the cylinder to "slides," worked from the fly-wheel shaft by means of an excentric, thence through the excentric rod to a "commutator" on the shaft, and through the piston coils back to the battery. The "slides" regulate the current passing round the cylinder, so that dissimilar poles front the piston, the other poles being charged so as to have a similar polarity to the piston. The "commutator" changes " the direction of the current round the piston at the end of each " stroke."

" As one part of the piston enters the cylinder, the other part of " the same passes out of it, and induces thereby a secondary " current in the coiling round the cylinder flowing in the same " direction as the primary or battery current, adding thereby to the " power produced by the latter."

A rotary engine is described and shown. "Several hollow " electro-magnets" are "placed inside a large ring of iron" "in

" such a manner that their poles radiate towards the centre of the " ring." Two brass wheels, fixed "on the shaft applied in the " centre of the engine," carry the axes of "revolving keepers;" these axes being equidistant from the centre, and allowing the keepers to move over the magnets as they are attracted by their successive action. The electro-magnets have "false poles," and the keepers have "segments," which work one into the other, without touching, during the action of the engine. A suitable commutator arrangement charges the electro-magnets in succession, in advance of the "revolving keepers."

In both these engines the destructive effects of the electric spark are prevented by connecting across the magnet and battery circuits respectively by "slender and long brass wires," so that the current is never broken.

[Printed, 11*d.*]

A.D. 1854, October 20.—N° 2243.

ALLAN, THOMAS.—" Improvements in applying electricity."

These improvements refer to the details of an electro-magnetic engine described in the Specification of Letters Patent granted to the Patentee, dated June 24th, 1852 (See N° 14,190, Old Law); they are as follows :—

1st. Methods of transferring the electric current "from one " magnet to another in the series." A metallic spring on the connecting rod is made to pass over two insulated upright pieces or strips of metal; one piece is connected with a battery pole, and the other is divided into insulated sections crossways, each section being connected to a corresponding magnet; each magnet is thus included in the circuit in succession. There is "a distinct " arrangement to each connecting rod."

For circular and continuous action, these pieces of metal are concentric rings mounted on the face of a wooden disc; a radial arm on the engine shaft, during its rotation, completes the various circuits. By using "a double sectional zone," the engine can be reversed on shifting the arm accordingly. The "zones" or rings may be placed on the periphery of the wooden disc.

2nd. Arranging the magnets. Several upright cores or poles are affixed to a flat plate, and coiled separately; these are " polarized alternately as regards each other, and not in pairs, as " so many pairs of horse-shoe magnets."

3rd. "In lieu of connecting rods," using "double piston rods "with cross-head slides, acting direct on the crank pin with or "without a sliding bush."

4th. "In lieu of cranks," using "an indented drum or ratchet "wheel, actuated by palls affixed to piston rods, so that pairs of "magnets acting alternately on the piston rod or rods will cause "rotation of the drum or shaft."

5th. "In lieu of keepers, when the arrangement of the magnets "is in pairs, as above," making "one of the magnets of each pair "moveable, and so acting attractively and repulsively with the "other that is stationary."

"Permanent magnets may be substituted for either the moveable "or stationary magnets."

[Printed, 10*d*.]

A.D. 1854, October 21.—N° 2247.

EDWARDS, William Alexander.—(*Provisional Protection only.*) "Seperating iron or steel from brass, gun metal, and all "other metallic filings."

The nature of this invention is as follows:—

"The application of electric power for the extracting of iron or "steel from metallic filings, and which is done in manner "following:—Having placed a revolving bar, cylinder, or other "piece of iron in the centre of a coil or coils of wire, the end of "which projects from such coil, and also placing such coil in "connection with batteries, the bar, cylinder, or other piece of iron "or steel becomes an electro-magnet, and upon any metallic "particles being brought into contact with the bar, cylinder, or "other piece of iron or steel, it attracts and holds all particles of "iron or steel, so that all other metallic particles are entirely freed "and purified from them."

[Printed, 3*d*.]

A.D. 1854, October 23.—N° 2255.

BRADE, Abraham Gerard (*a communication from Ambroise Auguste Masson*).—"Improvements in the manufacture of plate "and thread for gold and silver lace and bullion."

These improvements form an addition to those set forth in the Specification of N° 62 (1854).

One of the present improvements consists in applying the mode set forth in the former Specification, and the machine therein described, to gilding, silvering, or covering with any other suitable precious metal, silver, copper, or other metallic plate (the gold lace-makers' name for flattened wire).

A second improvement consists in applying the same mode to gilding, &c. one surface of the plate, and leaving the opposite surface uncovered, or only slightly covered. That surface of the plate which is not to be acted on by the solution is coated with any suitable reserving or resist varnish; this is afterwards removed by any suitable solvent. A second method is to employ a cylindrical non-conducting horizontal revolving roller, part of the diameter of which is kept immersed in the metallic solution; the plate is applied against that part of the roller surface that is immersed in the solution; thus one side of the plate is coated and the other side preserved.

Bullion may be manufactured at once with the above-described coated plate; if the plate is gilded or silvered on one side only, it may afterwards receive a coating on both surfaces, either by immersion or with the aid of a galvanic current.

[Printed, 4d.]

A.D. 1854, October 25.—N° 2276.

LAMBERT, François.—"Improvements in compounds to be "used as cosmetics."

"This invention consists in introducing, in the preparation of "cosmetics, chemical substances susceptible of reacting on one "another, so as to develope a dynamic electricity, the action of "which strengthens the hair, the beard, and the skin."

To produce the reaction, it is preferred to employ "the pure "acid sulphate of the peroxide of iron" dissolved to saturation in alcohol, and a solution of a small quantity of "crystallized nitrate "of silver" sheltered from the air and light. "When this "liquid is exposed to the air or light, a double decomposition is "produced, which disengages electricity. Other substances "capable of producing by acting on one another an electric action" may be used, that is to say, certain acid metallic oxides or acids, "or any non-acid salt of a weak base, with a basic metallic oxide," "or any salt of which the acid is unstable." "The moderate and "continued electric effect produced by a double decomposition can "be regulated by the proportion and the choice of substances, and

"can easily be determined by means of the Sweiger's galvanometer "and the Bouenberger's electroscope."

After the application of this liquid, a balsamic essential oil, or other essence, oil, or fat, is employed, to hinder "the too rapid "evaporation of the first liquid." Pulverized gold leaf is mixed "with this second preparation to favour the production of "electricity.

All toilette cosmetics may be made "producers of electricity" by the application of the above principles.

[Printed, 3*d*.]

A.D. 1854, October 30.—N° 2305.

HADDAN, John Coope.—"Improvements in projectiles, and "in machinery for manufacturing the same," relating to :—

1st. Manufacturing rockets (See Printed Specification N° 10,008, Old Law.)

2nd. "Making shell or hollow projectiles with discs, rings, ribs, "or extra thickened portions in or on their insides or interior "surfaces, for strengthening them, so as the better to resist "any pressure in the cannon."

3rd. "Constructing projectiles which are intended to be used "with a wad, and to receive a rotation on their longitudinal axis "directly from the rifling of a cannon."

4th. "Making projectiles with wings or projecting sliding "surfaces upon them, which shall not only impart the twist, but "by their form and disposition shall (whilst the projectile is being "discharged) also cause or tend to cause the axis of the projectile "to coincide with that of a cannon having corresponding or "suitable rifling."

The Specification of a Patent granted to the Patentee, October 14th, 1854, is referred to.

5th. Making the "wings," referred to in the last improvement, in the same piece with the projectile, or of separate pieces of metal, secured or fixed upon them; also using certain machinery for forming or finishing the wings upon projectiles.

Under the first of the heads of this improvement, amongst other methods of securing wings to the projectile, it is proposed to form "the projectiles with wings" "*by depositing, by any approved* "*electro-galvanic apparatus*, either copper or other suitable metal

" on to the projectile in the proper positions; and this method may " be used in combination with or after any of the others, if " desired."

[Printed, 8*d.*]

A.D. 1854, October 31.—N° 2311.

REID, William.—" Improvements in the manufacture of gal-" vanic batteries."

This invention consists in the application of glass to the manufacture of troughs for galvanic batteries that are " divided by two " or more partitions into three or more cells," the several partitions being made " of one piece of glass with the other parts of " the trough."

This invention is carried out by means of metal dies; one, a trough corresponding to the external dimensions of the glass trough; the other consisting of as many " rams or forcers " as there are battery cells. The glass is poured into the trough die in a melted state, as much as will make the required trough; the hinged cover of the die is then fastened down, and the upper die or mould is pressed down, " so that the rams or forcers may " pass through the openings in the cover, and descend into and " cause the fluid glass to fill those portions of the interior of the " lower mould which are not filled by the rams or forcers."

" In order to protect such troughs from injury, they are cased " on the outside with gutta percha, wood, coir, matting, or other " tough material."

[Printed, 3*d.*]

A.D. 1854, November 8.—N° 2362.

GLUKMAN, Leone.—" Improvements in effecting electric com-" munications in railway trains."

This invention relates to the use of certain " compound hooks " and eyes or couplings " " for connecting the different parts of a " metallic circuit through which electricity of low tension is to " pass."

To the framing of each carriage lengthways, midway between the wheels, a bar of fir wood is fastened. There are as many grooves in the bar as wires; the wires are laid in the grooves, and have their extremities soldered to " spiral " [helical?] springs of closely coiled brass wire. The extremities of the springs are

straightened and soldered to the couplings, which are of brass. The straight ends of the springs and the tails of the hooks and eyes are embedded in a flat mass of gutta percha. The lengths of the wires and springs are so adjusted that when the carriages are coupled the wires may be hooked together with a moderate tension, and when unhooked, the hooks may hang out a few inches.

Each piece of brass may either be used as a hook or as an eye, for the body of the hook has a rectangular slot which forms an eye, and the portion turned over to form the hook is narrowed so as to enter the slot of the opposite brass piece.

To ensure metallic contact, studs of "platina" are riveted into the tongues and in front of the slots.

[Printed, 9*d*.]

A.D. 1854, November 9.—N° 2373.

PRETSCH, Paul.—"Improvements in producing copper and other plates for printing."

This invention "consists in adapting the photographic process "to the purpose of obtaining either a raised or a sunk design on "glass or other suitable material or materials, covered with glu-"tinous substances mixed with photographic materials, which "aforesaid design can then be copied *by the electrotype process*, "or by other means, for producing plates suitable for printing "purposes, or can be applied for producing moulds applicable for "obtaining plates."

To prepare the gelatinous solution for coating the glass plate, the following process is preferred:—A solution of clear glue is divided into three parts, one part is added to a strong solution of nitrate of silver, the second part to a weak solution of iodide of potassium, the remainder is added to a strong solution of bichromate of potash; the three solutions are then mixed, and the mixture poured over a level plate of glass, thereby forming a coating on the glass when completely dry. The subject to be copied is then laid on the prepared surface, and the whole is suitably exposed to the influence of light.

To raise the design the coated glass plate is then treated with water, alcohol, or solutions of borax; the photographic copy is made firm by applying astringents and drying varnish, copal varnish and a weak solution of tannin are preferred.

The picture will appear sunk, if in the above-described process a solution of gelatine be used instead of glue; the astringents and drying varnish are not used in this case.

Printing ink may be applied to the coating of the prepared plate, and the design transferred to zinc or stone, instead of using the electrotype or stereotype process.

If the "ammonium bromide" or iodide be used instead of the iodide of potassium, the time of exposure to light is shortened, and the photographic camera can be used.

[Printed, 3*d*.]

A.D. 1854, November 21.—N° 2455.

CALLAN, NICHOLAS.—"Improvements in exciting agents used "in galvanic batteries, and in the construction of galvanic "batteries," consisting of:—

1st. The use of the following exciting agents, either to both elements or to the negative element only, in carbon-zinc batteries, and other batteries in which zinc is the positive element: —"First, "undiluted muriatic acid, whether used alone or with sulphuric "or certain other acids, such as pyroligneous manganic acid, &c.; "secondly, muriatic or sulphuric acid, or both together," mixed with less than five or six times the quantity of water.

2nd. "Using cast-iron cells (that is, cast-iron vessels which will "hold the exciting fluid,) made in such a way that both sides of "the zinc plates within them will act, and that the distance be-"tween the zinc and iron, or between the greater part of their "respective surfaces, will not exceed a quarter or five-sixteenths "of an inch, unless the surface of the zinc plates exceed thirty-six "square inches." To enable the cells to contain a sufficient quantity of the exciting fluid, the upper part of the cells are made wider than the lower part.

That part of the iron or zinc which has little or no effect in producing the galvanic current is covered with a substance, such as wood, vulcanized India-rubber, &c., on which the exciting fluid will not act.

[Printed, 3*d*.]

A.D. 1854, November 21.—N° 2456.

CRAIG, Thomas, and DANIELS, Alfred.—(*Provisional Protection only.*) "Improvements in the mode or method of com-"municating signals on railways."

It is proposed "to fix electro-magnetic apparatus on the lines "of railways at any required distances asunder, so that any train "passing will act upon the said apparatus, by means of a projecting "bar or similar contrivance, acting upon a cross slide or bolt "communicating with the engine, the said communication either "to open the whistle or shut off the steam. This signal being "continuous on the line, will warn the persons in charge of the "train of any other train in advance of them."

[Printed, 3*d.*]

A.D. 1854, November 21.—N° 2457.

KNIGHT, Richard.—1st. "Improvements in apparatus for "testing iron, as to its capacity for receiving magnetism." The bars of iron to be tested are supported "in the magnetic meridian," and coils placed over their ends; a piece of soft iron is rotated in the presence of the ends of the bars, and the deflection produced on a galvanometer connected with the terminals of the coils noted. For the purpose of carrying out this part of the invention successfully, a frame, with levelling screws, carries the axis of a shelf; a graduated scale, attached to one of the uprights of the frame, enables the shelf to be placed in the line of the dip of the needle. The shelf carries the coils and the axes of pullies to rotate the soft iron, also clamps to fix the iron bars to be tested.

2nd. Improvements in "magnetic apparatus." A magneto-electric machine is described and shown, in which the coils are placed over the fixed permanent horseshoe magnet, and an electric current is excited in them by the rotation of a soft iron armature in front of the poles of the permanent magnet.

[Printed, 6*d.*]

A.D. 1854, November 29.—N° 2510.

GOWLAND, George.—"Improvements in the mariner's com-"pass."

This invention "relates to improvements in compasses, having

" cards of spherical, cylindrical, or other similar form, with the " points marked on their periphery." (See N° 1681, 1853.)

A mariner's compass is described and shown having the following peculiarities :—

The box is constructed of two hemispheres of glass attached to a vertical brass ring, and is supported on rollers working in a groove on the vertical ring, and revolving on centres in a large ring free to turn on a fixed horizontal axis. By this means the effect of the ordinary gimbals is obtained, " while the two sides of " the box are fully exposed to view." The box is weighted at the bottom, to preserve the needle pedestal or "stud" vertical.

The needle is supported on the pedestal by the intervention of a hollow cone. The pedestal carries a hemispherical cup, in which rests a spherical stud carrying the hollow cone; the "pin" or centre of the needle is supported by an agate cup in the centre of the stud, thereby making all the motions to which the needle centre may be subject concentric with its centre of motion, and reducing them to a minimum.

The spherical or cylindrical card is suspended to the needle by gimbals, thus preventing the vertical vibrations of the needle, whether from the variation of dip or from other causes, from affecting the card.

The hollow cone carrying the needle centre is prevented from turning horizontally by means of a vertical circle or semicircle of wire attached to the cone, and working freely through a crutch fixed to the vertical ring of the box; another wire circle is attached to the cone and to the vertex of the first wire, at right angles to it, so that it may serve as a "'lubber's line.'"

The card may be made of magnetized thin sheet steel, either a complete ring or two semicircles, with their similar poles united by copper.

Another circle of wire, carried by a milled head fixed to the vertical brass ring of the box, enables azimuths and amplitudes to be taken.

"A course indicator," with a card similar to the above-described compass card, or having the graduations made on a strip of calico wound on rollers, is placed on the top of the binnacle; the card is moved by hand, and shows the helmsman the course he is to steer.

Another compass is described and shown on the same general plan, except that the compass box is mounted on a fixed pedestal by means of its hollow coned bottom, which carries a hemispherical cup supporting another hollow cone and the needle centre. To check the oscillations of the compass box in stormy weather, a vulcanized caoutchouc or other elastic band, attached to the opposite sides of the bottom of the box, passes under a fixed pulley.

Other modifications of the above-described compasses are suggested in the Specification.

[Printed, 1s.]

A.D. 1854, November 30.—N° 2521.

SANDS, JOHN (*a communication from William Graham*).—"Improvements in the mariner's compass."

"This invention has for its object a mode of applying magnets " to a mariner's compass, with a view to neutralize or correct the " effects of local attraction, whether the ship or vessel be of " iron or wood. And the improvements consist of applying a " series of magnets around the basin or frame within which " the compass card is suspended, and four or more magnets " are applied, each having the means of readily adjusting its " position in respect to the axis of the compass card and the " magnetic needles combined therewith. It is preferred that each " compass card should have two magnetic needles fixed parallel " to each other."

The correcting magnets are "arranged in radial positions in " respect to the centre of the card," and " are placed in grooves in " the frame of the compass in such manner that the horizontal " plane in which the magnets on the compass rotate coincides " with the plane in which the magnets" "are applied." To neutralize the local attraction of the vessel on the needle, when the vessel is on a "level keel," nuts and screws adjust the magnets radially from the needle centre. If any want of correctness is found when the vessel is made "to heel over," it is obviated by raising or lowering the needle centre, it being adjustable by a screw for that purpose.

[Printed, 9d.]

A.D. 1854, December 2.—N° 2535.

HESS, RICHARD.—(*Provisional Protection only*). "An improved "voltaic battery for medical and philosophical purposes."

"This improved battery is composed of a number of compound "plates, each plate composed of two plates of different metals, "soldered or otherwise brought into close contact with each other, "one metal being negative and the other positive, as copper and "zinc, or silver and zinc. Between each pair of compound plates "is interposed a plate of fibrous or absorbent substance, as "paper, wood, felt, &c., and the whole is kept together by a rod "composed of some non-absorbing and non-conducting substance "passing through the mass." The mode preferred for this purpose "consists in drawing a tube of india-rubber through a hole "in each metallic and absorbent plate, and forcing a metallic wire "through the tube, in order to effect a complete isolation" [insulation?] "between each pair of compound plates."

[Printed, 3d.]

A.D. 1854, December 5.—N° 2555.

VARLEY, CROMWELL FLEETWOOD.—"Improvements in pro-"ducing and applying dynamic electricity," consisting of:—

1st. The use of a positive metal of a conical, sugar-loaf, "or "similar form, placed over the negative metal, so that by its form "any negative metal deposited thereon shall fall off by the action "of gravity." A galvanic battery is described and shown as follows:—A plate of copper extending over the bottom, and partially up the sides of the containing vessel, and containing "crystals of "negative salt," a "layer of cloth," a solution of zinc above the layer, and a conical mass of zinc having the apex downwards.

2nd. "The use of two or more porous divisions, with a solution "or metal, or both, between them, to decompose any negative "salt that might otherwise pass to the positive element." A galvanic battery with this improvement may be constructed as follows:—An outer vessel containing a copper lining, and a solution of "negative salt;" an outer porous cell, immersed in the solution of "negative salt," and containing a perforated zinc hollow cylinder in a solution of zinc; and an inner porous cell, immersed in the solution of zinc, and containing a solid cylinder of zinc in a suitable solution.

3rd. Using "negative salts of difficult solubility with the nega-" tive elements." A mercury-zinc battery is described and shown, in which sulphate or other salt of mercury and the same salt of zinc is used. The mercury is at the bottom of the containing vessel, above that the insoluble salt, then the zinc solution and a solid cylinder of zinc. This arrangement is "very con-" stant."

4th. "Applyingt o the poles of the battery a series of induction" surfaces." Sheets of tin-foil, alternating with sheets of oiled silk, are alternately connected with the battery poles, the right-hand corners of alternate sheets are cut away, and the left-hand corners of the other sheets, for that purpose. These may be used for "telegraphic and electric light purposes."

[Printed, 7*d.*]

A.D. 1854, December 5.—N° 2556.

JOHNSON, John Henry (*a communication from M. Brequet* [*Breguet?*]).—"Improvements in the arrangement of electric" telegraphs."

This invention "relates to the construction or arrangement of" portable electric telegraph apparatus, which may be placed in" connection, when desired, with any part of the line wires of" a railway telegraph, or employed in mines, manufactories" private houses, public or Government offices, and colleges."

The whole apparatus necessary for receiving and transmitting intelligence is contained in a portable box with suitable handles and hinges. The bottom part forms a box for the battery of 18 or more elements; the upper part consists of "a small" wooden case, opening by a hinge joint, and containing an" alarum, manipulator, and receiver. The hinged portion of this" case, which opens back, contains a nautical compass, two coils" of wire, and a lightening conductor."

The battery is composed of "sand moistened with water for the" zinc, and with sulphate of copper for the porous cells."

When the apparatus is used, the completion or non-completion of the circuit is first tested, by means of the compass and coils of wire in the hinged portion of the case. Any message may then be sent, and the answer received, as at any ordinary telegraph" station."

[Printed, 10*d.*]

A.D. 1854, December 11.—N° 2608.

PULS, FRANCIS.—" Improvements in electro-galvanic apparatus " for medical purposes, part of which improvements are also " applicable to other electro-galvanic apparatus."

The main features of this invention are as follows :—" A single " fluid or dry battery " is arranged for intensity in only one cell or trough, without any division between the plates. The battery plates are placed alternately, and are fixed (by preference), in a tray of gutta percha ; they are " so arranged, that each plate, whether of " positive or negative metal, shall be rigidly connected with the " next plate but two before or after it in the battery, the only " exception being the second plate from one end of the battery."

The Provisional Specification states that the battery tray is placed in one of two compartments of an oblong box ; the other compartment contains " the conductors and the apparatus for the " induced current." " The induction apparatus is rendered " adjustable by a platina spring in connection with the coil."

[Printed, 5d.]

A.D. 1854, December 16.—N° 2652.

FRIEND, MATTHEW CURLING, and BROWNING, WILLIAM. —" An apparatus for determining the magnetic aberrations occa- " sioned by local attraction."

An instrument called a " pelorus " is used in connection with an improved binnacle compass. It consists of a metallic bar, furnished with sight vanes and verniers, free to move concentrically within a divided ring ; a disc or card (similar to that of an azimuth compass, but without any magnetic needle), moving concentrically with the above-described parts, is placed beneath the metallic bar, and can be fixed to it at any required point by a screw nut. The whole apparatus may be suspended by " gymbals," and balanced in a horizontal position by a weight in the ordinary manner.

To bring the binnacle compass to a corresponding degree of accuracy to the " pelorus," so that they may be advantageously used in conjunction, the upper surface of the card is divided as accurately as that of the " pelorus," and a moveable index or hand works from the centre over the upper surface of the card.

In using the " pelorus," the zero point is placed to represent and coincide with the head of the ship. To find the local attraction of

a ship before leaving port, the moveable card is set to correspond with the binnacle compass, and screwed tight to the metallic bar whilst in a position to enable the most distant object to be seen through the sight vanes. The bar is kept in this position whilst the vessel is swung completely round, and the direction of the ship's head is noted at every point of the compass, both by the "pelorus" and by the binnacle compass; the local attraction at the various points of comparison is the difference between them. The local attraction is observed at sea "by means of amplitudes "and azimuths of the heavenly bodies."

[Printed, 4*d*.]

A.D. 1854, December 20.—N° 2688.

WALKER, ROBERT.—"Improvements in telegraphing."

When it is required to transmit signals "in one direction only "from a given station or position," the line wire is connected with one battery pole; the other battery pole is connected with the earth. On making connection between the line wire and the earth at any point, signals are conveyed to all the signal instruments between the point of connection and the battery.

When it is "desirable to transmit intelligence in both directions "from the telegraphing station," two batteries are employed, one at each end of the line wire; each end of the line wire is connected with similar poles, the other battery poles being connected with the earth. When a connection is made between the line wire and the earth at any position intermediate to the batteries, signals are transmitted in both directions, as two circuits are thus completed at once.

In either of the above methods of arranging circuits, by introducing a signal instrument between the line wire and the earth at the place of transmission, signals can be received as well as given.

"When communicating from a station to the temporary "instrument, the introduction of a local battery at the station is "found desirable, for the purpose of reversing the currents."

"Instead of depending upon the earth for completing the "circuit, as above described, a second wire may be employed," as described in the Specification of Letters Patent, N° 414 (1854).

[Printed, 4*d*.]

A.D. 1854, December 21.—N° 2699.

JOHNSON, JOHN HENRY (*a communication from Etienne Lenoir*).—(*Provisional Protection only.*) "Improvements in the "application of the electrotype or galvano-plastic processes."

"This invention relates to a mode or processes whereby entire "statuettes or other objects may be produced, in place of being only "produced in half relief, and consists in making a mould or matrix "of plaster, gutta percha, metal, or other suitable material, corre-"sponding exactly in size and form to the object to be repro-"duced." If the mould is not a good conductor the inside is coated with metal; the mould is separated into two or more parts, a flat dissolving plate is suspended in a suitable solution inside the mould, and when the requisite battery connections are made the mould is closed. "After the completion of the process" the statuette or other object will be found in the interior of the mould, it having been deposited therein from the included plate by the action of the galvanic battery.

[Printed, 3*d.*]

A.D. 1854, December 22.—N° 2708.

JOHNSON, JOHN HENRY (*a communication from Thomas C. Avery*).—"Improvements in electro-magnetic engines."

An electro-magnetic engine is described and shown having the following peculiarities:—

Four or more fixed electro-magnets "are combined in pairs, so "as to present their poles towards a common centre, leaving space "between the poles to admit an axis." On the axis are fixed "magnetic levers," with space enough between them so as just to enable them to clear the legs of the fixed electro-magnets. Rotary motion is given to the axis by the action of the fixed electro-magnets upon the "magnetic levers;" one pole of the battery being connected to the axis, and cams making battery connection with "palls" or "circuit closers" at suitable times for that purpose.

Each electro-magnet is double branched, and acts upon the revolving magnets with both its poles. In order that the "mag-"netic levers" may be exposed to as much action as possible of the electro-magnets, the electro-magnets are coiled only at the bend; the axis of the coil itself being parallel to the driving shaft or axis

supporting the "magnetic levers." The levers are thus enabled to "embrace the poles of the fixed magnets successively as they "rotate."

By the arrangement of cams and the conduction of the current through the driving axis, "the current of magnetism and electri-"city" is "combined in such manner that the power obtained is "due to the size of or bears a relation to the mass of iron under "excitement."

To increase the magnetic force, a coil or helix, parallel to the driving axis, "may be interposed between the inner bars" "of the "revolving magnetic levers."

[Printed, 9*d*.]

A.D. 1854, December 26.—N° 2722.

BISHOP, Benjamin, and DYER, Joseph.—"Improvements "in the manufacture of hinges," consisting of:—

1st. "The casting of the parts forming the knuckles of hinges "open, which knuckle parts are afterwards to be bent into form."

2nd. "The coating of such hinges with a deposit of copper or "brass, when such hinges are made of malleable iron, *by the agency* "*of electricity* or other suitable and practicable means." This improvement is not mentioned in the Provisional Specification.

[Printed, 8*d*.]

A.D. 1854, December 26.—N° 2724.

THOMAS, Frederick Samson, and TILLEY, William Evans.—"An improved process for plating or coating lead, iron, "or other metals with tin, nickel, or alumina" [aluminum?].

This invention relates to the method and materials employed in preparing solutions for electro-depositing the above mentioned metals.

For tin.—Metallic tin is dissolved by nitro-muriatic acid and "the "oxide of tin," precipitated by the ferrocyanide of potassium; sulphuric or muriatic acid is mixed with the precipitated oxide, and the whole is boiled in an iron vessel with a small portion of ferrocyanide of potassium; when filtered, the solution is completed. Another solution of tin is prepared as follows:—Ferrocyanide of potassium is added to "the oxide of tin" (precipitated as above described), the whole is then boiled, set aside to cool, and filtered; "a stream of sulphuric" [sulphurous?] "acid gas" is then passed through the solution.

For nickel.—The metal is dissolved in nitro-muriatic acid, and the oxide precipitated by ferrocyanide of potassium; the oxide is washed, added to a solution of cyanide of potassium, the whole is then boiled, cooled, and filtered.

For aluminum.—Ammonia is added to an aqueous solution of alum until it ceases to precipitate; the alumina is then washed, filtered, diluted with water, boiled with cyanide of potassium, cooled, and filtered.

In electro-depositing these metals, a positive pole of the metal or of platinum, may be used. A bag containing oxide of nickel may be used in the nickel bath, or containing alumina in the aluminum bath.

[Printed, 3*d*.]

A.D. 1854, December 27.—N° 2729.

DUNN, John Lang.—" Improvements in working up certain " waste sulphates and nitrates, and for the manufacture of useful " products therefrom."

This invention relates to the treatment of the nitrates of copper and iron "obtained as waste products in the etching of printing " rollers and other printing surfaces;" also of the "sulphate of " lead obtained from the chemical combinations attending certain " of the operations of calico printing."

Nitrate of copper is treated as follows:—After sufficiently diluting it with water, litharge (in proportionate quantity) is added, and heat applied; "after a time the liquor is drawn off, and the resi- " duum is boiled and partly added to the liquor before drawn off; " this is again diluted, and metallic lead added, and the copper con- " tained in the liquor is deposited *by electrical agency* and sepa- " rated. The original liquid, when quite freed from copper, is " evaporated in the usual manner to obtain crystallized nitrate of " lead." In the Complete Specification no mention is made of the employment of electricity.

Nitrate of iron is saturated with ammonia and filtered. The products thereby obtained are nitrate of ammonium and peroxide of iron; the latter is dried and otherwise prepared "for paints, &c."

Sulphate of lead is converted into "sulphuret by calcination " with charcoal, and then into nitrate by addition of nitric acid."

[Printed, 3*d*.]

A.D. 1854, December 28.—N° 2741.

GRAY, John.—" Improvements in adjusting compasses on board " ships or vessels."

This invention refers to correcting the effects of local attraction upon ships' compasses.

In order to allow for the magnetic conditions of a ship being changed during a voyage, the correcting magnets in the binnacle are made moveable by means of screws or racks and pinions. The correcting magnets are arranged so that part of them are placed in a line with the keel of the ship, and part at right angles thereto; they are moveable or adjustable " to or from the compass in lines " transverse of the longer axis of the correcting magnets, and " they are not moveable in the directions of their longer axes."

The above-described correcting magnets, and their adjustments, are used for correcting the local attraction on the vessel being directed north and south and east and west. To correct the local attraction when the vessel is " heeled over," a vertical magnet (adjustable by rack and pinion) is introduced vertically beneath the needle centre of the compass.

[Printed, 5d.]

A.D. 1854, December 30.—N° 2759.

DERING, George Edward.—" Improvements in obtaining " motive power when using electric currents."

This invention " consists in applying that law which was " discovered by Ærsted " [Oersted?], " that a magnet, when free " to move in the neighbourhood of a wire or other conductor " through which a current of electricity is passing, will have a " tendency to place itself at right angles to the conductor, the " north and south poles of the magnet assuming a definite position " with reference to the direction of the current in the conductor."

An arrangement similar to that of a galvanometer is preferred, " the wire of the coil " being so disposed " as to circumvent the " magnet at all parts of its revolution on the axis." It is preferred to use a second magnet on the same axis in connection with a second coil, to act " at those parts of the revolution during which " the other is inactive." A suitable " current changer," for letting on, cutting off, and reversing the current at proper times, is used with each coil.

For the coils, it is preferred to use an insulated non-twisted "wire rope of rectangular section," the wires being "simply laid "together and held in position by the outside covering."

The spark and its destructive effect is obviated by completing a short circuit "between the ends of the coil" just previous to breaking battery connection.

The retarding effect of induced currents is avoided by interposing non-magnetic metallic plates between the coil wire and the magnet, "as in Professor Henry's well-known experiments upon induction."

[Printed, 4*d*.]

1855.

A.D. 1855, January 1.—N° 1.

FRASCARA, Epaminonda.—(*Provisional Protection only*). The invention is for "a voltaic pile, and of the application of its electric "fluid, either to the decomposition of water, or to enable the "gases to replace the steam power actually in use."

A galvanic battery is described and shown, consisting of "coal" [coke, or other conducting form of carbon ?], liquid "ammoniaca," nitric or sulphuric acid, and cast iron. The diaphragm is formed of paper which has been immersed in concentrated nitric acid, the paper used being free from gum, and made entirely of linen rags.

The method of applying this battery to the decomposition of water for the obtainment of motive power is as follows :—The water is decomposed by platinum "conductors" in separate vessels, one for the oxygen, the other for the hydrogen gas. The hydrogen proceeds from its vessel to a "condensor," where it is heated by the combustion of the combined gases, by which means it acquires a high degree of tension, and can be employed to drive the piston of an engine. The oxygen may also be heated in the same "condensor" as the hydrogen.

In another method, the gas is heated by a net-work of fine platinum wire rendered incandescent by the battery current.

"At every stroke of the piston the gas is condensed twice, and "twice reproduced in the alembics of the voltameter." This is accomplished by means of a cylinder with concentric wheels

(driven by the engine), which make electric connection alternately with the "condensor" and with the "alembics." "Another "eccentric wheel," "at every revolution" of the shaft, opens and shuts a valve from the hydrogen "alembic" to the "condensor."

[Printed, 6*d.*]

A.D. 1855, January 3.—N° 18.

JOHNSON, JOHN HENRY (*a communication*).—"An improved "system or mode of coating iron with copper."

The iron is submitted to the following processes:—

To cleanse the iron, it is acted on by dilute sulphuric acid, washed in cold water, then in boiling water. It is then placed "in a lye of caustic soda," and finally in quicklime, where it is kept for several weeks.

A thin preservative coating of copper is then electro-deposited upon the iron. The bath is composed of a solution of "cyanide "of potassium" and "cyanide of copper" (the Provisional Specification states "cyanate of potassium" and "cyanate of "copper"), and an intensity battery is used that will evolve hydrogen during deposition.

The iron is then electro-coated with a thick and permanent coating of copper by means of a quantity battery, in which the surface of the plates bears as close a relation as possible to that of the articles to be coated. The bath is composed of a hot acid solution of sulphate of copper.

Instead of a thin preservative covering of copper, an electro-coating of lead may be used. The solution used for this purpose is made by dissolving litharge (protoxide of lead) in an aqueous solution of potash. This method is preferred to electro-coating with a thin preservative coating of copper.

[Printed, 4*d.*]

A.D. 1855, January 6.—N° 34.

COOK, BENJAMIN.—"Certain improved apparatus for separating "filings of iron or steel from other metallic filings."

This invention "consists in so constructing a cylinder of any "convenient size as to be strongly magnetic on its surface, and "which is effected by placing a sufficient number of magnets "(their poles being at right angles to the axis of the cylinder) on

"its surface. Being so constructed, it is mounted on a suitable
" stand, together with a cylindrical brush of the length of the
" magnetic cylinder, and so disposed that by suitable gearing it
" revolves at the same time, and with any desired velocity, but
" always greater than that of the magnetic cylinder. Above these
" is placed a hopper with a long narrow mouth (capable of regula-
" tion), through which the filings previously placed in the hopper
" pass, and as they fall upon the magnetic cylinder the particles
" of iron or steel are attracted to its surface, while the other
" metals fall into a proper receiver. The particles of iron or steel
" being carried by the revolution of the cylinder to the brush, are
" thereby swept off into another receiver. This apparatus may be
" worked by steam or other power, as most convenient to the
" user."

The Drawings show horseshoe permanent magnets with their arms radiating from the centre of the cylinder. The cylinder is made up of rings of magnets, their poles alternating round its circumference, but of the same name in parallel lines to its axis. Each magnetic pole is separated from the neighbouring poles by a non-magnetic material. The cylinder of magnets is mounted between discs of copper. The hopper has "a jiggling motion" imparted to it, and has several false bottoms of wire-work to sift the filings.

[Printed, 10*d.*]

A.D. 1855, January 6.—N° 40.

COTTAM, George Hallen, and COTTAM, Henry Richard.—(*Provisional Protection only.*) "An improvement in " the manufacture of iron bedsteads."

"This invention has for its object to improve the surfaces of
" iron bedsteads by substituting a deposition of brass on the
" parts of an iron bedstead, for the ordinary japanning or
" painting of the surfaces of such bedsteads heretofore practised;
" and the improvement consists of employing in the manufacture
" of bedsteads iron coated with brass deposited from solutions
" by electric currents, the deposition of the brass being in respect
" to some of the parts before, and in respect to other of the parts
" after, being made into form."

[Printed, 3*d.*]

A. D. 1855, January 12.—N° 83.

GUYARD, François Victor.—"Certain improvements in the "electro-telegraphic communications."

Telegraphic communication is established between trains, when they are within a certain distance of each other, by means of batteries and instruments on the trains, and line wires proceeding along the railway. The distance to which such communication extends is regulated by adjusting the intensity of the electric current. Another method of regulating the distance is by dividing the line wires into suitable lengths.

The wires are suspended from "a series of posts or double "gallows" placed between the two lines of rails. "Communi-"cators," consisting of copper spring-rollers placed on the locomotive, make the requisite electrical connection to the battery and instruments on the train.

When two trains come near enough to each other to communicate, in order to ensure the electric currents from each acting in unison, a "distributor" is used, which reverses the current from each battery at short periodical intervals. In the "distributor" a cam rotated by clockwork moves arms over transverse metal pieces.

A registering apparatus is put in action by electric contacts completed at certain distances along the railway by the moving train; this instrument enables the speed of the train to be known, and consists of a sheet of paper unrolled by clockwork, on which a mark is made by an electro-magnet and pencil whenever the circuit is completed.

Gates and swing bridges, by completing the electric circuit between the line wire and earth, when open, signal danger to an advancing train.

[Printed, 10*d*.]

A. D. 1855, January 19.—N° 148.

FONTAINEMOREAU, Peter Armand, le Comte de (*a communication*).—"Improvements in obtaining electro-motive "power."

A rotary electro-magnetic engine is described and shown. The coil axis is bent into the form of a circle, and within the coil, coincident with its axis, a magnetic ring is placed. The ring is supported in this position by friction rollers or other means, and

has a small portion non-magnetic; consequently, as successive portions of the coil are excited, the magnetic portion of the ring is moved into successive positions in the coil axis. Motion is communicated through the friction rollers to any desired object.

The circuit of the various portions of the coil is made and broken by a commutator or "distributor," the inlaid metal pieces of which have their insulated lines of separation inclined to the axis of the fixed cylinder of which they form a part; each portion of the coil is thereby brought gradually into operation. The induced current in the same direction as the primary battery current is utilized by closing the circuit of each portion of the coil "at the moment of the exclusion of the primary circuit."

A battery is proposed to be used, consisting of a "Bunsen's "battery," in which "hypochloride of lime (chloride of lime)" is proposed to be used instead of the nitric acid; dilute hydrochloric acid is used to the zinc plate.

Various details respecting modifications of this engine, the means of using its motive power, and the construction of magnets, coils, "distributors," battery, &c., are given in 16 "sections."

[Printed, 1*s*. 3*d*.]

A. D. 1855, January 20.—N° 157.

PEARCE, William Gore.—(*Provisional Protection only*).

"An improved method of projecting chain or coupled shot or "shell from double or single barrel guns, and causing them to "explode simultaneously *by electricity* and other means."

"The double gun is cast in the solid, and the two barrels bored "to an angle, and the chambers are made to communicate from "one vent by small touch-holes being drilled from the vent into "the right and left hand barrel; the shot are coupled together by "a metal chain, the slack of which hangs outside between both "muzzles; when fired, the balls take up the coupling, and "travel and expand together in equal degrees.

"The single gun is used by placing two of them together upon "one platform, or at greater distances singly, and, by a simple "combination of levers in connection with the pivot upon which "those guns are fixed in the platform, any angle may be "obtained for the projection of balls or shells coupled or "chained together."

[Printed, 3*d*.]

A.D. 1855, January 25.—N° 191.

JOHNSON, John Henry (*a communication from the Chevalier Gaetano Bonelli*). — "Improvements in the construction and "arrangement of electric telegraphs, and in the application "thereof."

This invention consists in the establishment of telegraphic communication between trains, or trains and telegraph stations, by means of batteries and instruments on the trains and at the stations, and an insulated iron conducting bar proceeding along the line of railway.

It is proposed to have the conducting bar of considerable cross-sectional area, supported by earthenware or other non-conducting supports on the transverse sleepers of the line, so that a "slider" on the locomotive may make electrical connection with the bar, whether the locomotive be at rest or in motion. The circuit is completed through the locomotive axles and wheels and the earth.

The conducting bar being so large in sectional area, it is preferred to work the signal instruments by "*derived* currents of "electricity," "instead of making the principal current pass "through all the spirals" [helices?] "of the coils of the tele-"graphic apparatus." In the case of the conducting bar being only equal in diameter to ordinary telegraph wire, the stations or locomotives can only correspond with those near at hand.

The above-described "arrangement of conductor may be em-"ployed in ordinary telegraphs in place of the wires now in use." "In this case the bar would be entirely covered with tar, and "might be protected by a sort of cover."

When a locomotive is required to transmit signals to other locomotives or to stations, a battery and "commutator" on the locomotive are used.

[Printed, 8*d*.]

A.D. 1855, February 3.—N° 253.

THOMAS, Frederick Samson, and TILLEY, William Evans.—"Improvements in plating or coating metals."

This invention consists in electro-depositing alloys of "any two "or more of the following metals, videlicit, silver, tin, copper, and "nickel," "upon metals and metallic substances."

Separate solutions of the metals are first obtained; these solutions are then mixed in the proportions requisite to form the

desired alloy; and finally the alloy is deposited upon the articles to be coated by means of a galvanic battery.

The following methods of making the metallic solutions are described:—

Tin.—Metallic tin is dissolved in nitro-muriatic acid, the oxide precipitated by ferrocyanide of potassium and washed. The oxide is then boiled with ferrocyanide or cyanide of potassium in distilled water.

Silver.—Pearlash or ferrocyanide of potassium is fused with "salts of tartar and ammonia;" the resulting alkali is added to the oxide of silver; the whole is then boiled in distilled water, and, when the solution is cool, filtered.

Nickel.—The same process as that for silver solution. The Provisional Specification states the same process as that employed for tin.

Copper.—A solution of the sulphate is precipitated "by salts of "tartar," and the alkali added as described for silver; or copper is dissolved by galvanism in cyanide of potassium solution. The Provisional Specification states the same process as that employed for tin.

The cyanide of potassium may be used as a solvent in any of the above-described solutions.

A positive pole of the alloy to be deposited or of platinum may be used; in the latter case a bag of the oxides of the metals is suspended in the solution.

[Printed, 4*d.*]

A.D. 1855, February 3.—N° 261.

ALLAN, Thomas.—"Improvements in obtaining and trans-"mitting motive power."

This invention relates chiefly to improvements upon the Patentee's "former Patents of 24th August 1852" [See N° 14,190?], "and 20th October 1854" [See N° 2243, 1854], "for applying "electricity."

The improvements are as follows:—

1st. "The transmitting of motive power by means of cross "head slides acting on two crank shafts rotating reversely, and "caused to act in combination." The crank shafts are "con-"nected by cog wheels, or other gearing, for the better amalga-"mation of their combined powers." This improvement is shown

applied to the Patentee's electro-magnetic engine, and may also be applied to steam and other motive power engines.

2nd. A "mode of obtaining motive power in electro-magnetic "rotary engines by applying the attractive forces of magnets to "the sides of a rotating disc or wheel in lieu of the periphery." A disc or wheel with radiating iron spokes is mounted on the driving shaft between two discs carrying electro-magnets. If there are an even number of rows of magnets, there are an uneven number of spokes, and *vice versâ*. "Each row of magnets or many-poled "magnet" will have to be magnetized successively as often as there are spokes in the wheel to make one rotation of the shaft.

[Printed, 1*s*. 4*d*.]

A.D. 1855, February 10.—N° 314.

INGALL, George Henry.—"Certain improvements in tele-"graphic communication, and apparatus connected therewith."

This invention consists in indicating the position of a train between two stations by means of electricity, the indications being made at one of the stations.

At each station there are two instruments and their batteries, one for the up train, the other for the down train. An insulated line wire is laid between the rails, having at intervals an apparatus for breaking the circuit of the electric current constantly traversing it. When a train traverses the line it breaks the circuit as it passes each apparatus, and actuates the pointer accordingly at the station with which the line wire is connected.

To break circuit, a wheel on the tender or guard's van passes over a spring boss fixed between the rails in connection with the line wire.

The dial of the indicating apparatus has as many divisions as there are interrupting apparatus in the circuit of the line wire, and each time an interruption in the circuit takes place a toothed wheel is released by a magnet and the pointer moves one division. An alarum rings at each movement of the pointer.

In case "it is safe to have two trains running at the same time" between two stations, there are extra dial plates and line wires, and the spring bosses are fixed at the extremity of a non-conducting lever which presents them alternately to the action of the roller.

It is also proposed to have other circuit breakers in the line at various points for the guard to signal in case of danger.

[Printed, 1*s*.]

A.D. 1855, February 13.—N° 332.

COMFIELD, Robert Petrie (*partly a communication*).—(*Provisional Protection only.*) "Improvements in the electro-"coating of iron and other metals with zinc and other metals."

This invention consists in using solutions of zinc for electro-deposition that have been used in galvanic batteries, hitherto considered as waste battery solutions. "The fluid may then be "again used in a battery as an exciting fluid, and thus be again "and again used both in a battery and in depositing metals."

Another improvement consists in amalgamating "with mercury "metals with which other metals are coated by electro-deposits," with the view to their better preservation from deleterious influences.

[Printed, 3*d*.

A.D. 1855, February 23.—N° 401.

RANKINE, William John Macquorn, and THOMSON, John.—"Improvements in machinery for laying subaqueous "electrical conductors for telegraphic communication," consisting of:—

1st. Preventing the successive coils of the telegraph cable from over-riding each other upon the brake drums or other drums round which they pass, "by interposing between such coils on "the circumference of each such drum a band of steel or other "suitable material wrapped spirally" [helically?] "round the "drum, and so fixed as to remain at rest while the drum rotates."

2nd. Guiding and regulating the motion of the cable by means of one or more pairs of pulleys in the place of one or more of the drums at present employed. The pulleys have grooves similar to those in winding engines for railway inclined planes; these grooves are either smooth or ridged transversely, and are separated by flanges. The pulley shafts are vertically over one another, so that the cable is "carried half round one pulley and half round "the other alternately as many times as there are grooves in their "circumference."

3rd. A method of lowering the cable into the water. Instead of the iron taffrail heretofore used to deliver the cable into the water, a drum or pulley projecting over the stern of the vessel is employed.

4th. Controlling the speed of the cable "by the adaptation to "that purpose of the resistance of fluids forced through narrow "orifices by pumps worked by the drums or pulleys" round which the cable passes.

5th. Abstracting the heat developed by the friction of the moving cable, by causing the pumps mentioned in the 4th improvement to dash water over the parts of the cable requiring it.

[Printed, 5*d*.]

A.D. 1855, February 28.—N° 439.

STANSBURY, Charles Frederick (*a communication from Charles G. Page*).—"An improved mode of ringing fog bells."

This invention consists in ringing fog bells "on shipboard, "or upon or near to reefs, shoals, or places dangerous to navi-"gators," by means of electro-magnetic power.

Clockwork is used to complete and break the circuit. Two wires are fixed to the verge of the escapement; the free ends of the wires are thus made to dip alternately into mercury cups, and establish and break the electric circuit in which the bell electro-magnets are included.

The battery and clockwork are placed in any accessible situation, and the electro-magnet and hammer-lever armature are placed at the comparatively inaccessible locality, insulated wires being laid between the battery and bell to complete the circuit.

A continuous ringing of fog bells can thus be kept up in any required locality, or in places where the sound would not prevent other sounds from being heard.

[Printed, 7*d*.]

A.D. 1855, March 1.—N° 455.

SMALL, Andrew.—"Improvements in marine compasses, and "in apparatus applicable thereto."

A binnacle is described and shown fitted up with the following arrangements:—A binnacle case with side lights and aft window, according to the usual construction, contains the indicating compass. In the binnacle are two adjusting magnets, one fixed fore and aft, the other athwartship; each magnet is moveable vertically in a groove by means of a screw and nut, and has a scale showing "the exact position to which the adjustment has been carried." "The top of the conical compass case" carries a small pendulum

to indicate the rolling of the vessel against a graduated scale; also a "dumb compass card" swung on centres athwartship only, and having a circular adjustment and sights to obtain the sun's azimuth and altitude. For this purpose one of the sights carries a hair line and hair-line piece, by the shadow of which upon the horizontal arm the sun's azimuth and altitude are obtained.

A second arrangement is described and shown as follows:—The indicating compass is in the interior of the body of the binnacle, a window being suitably placed for the steersman. Four corrective magnets are used, two above the needle card and two below. The plain top of the binnacle also carries a pendulum index and scale and a "dumb card," as in the above-described binnacle. To ascertain the whole error of the indicating compass card, a vertical latitude circle, mounted on the centre of the dumb card, carries a slide piece which forms the support for an hour circle and adjustable stile; in using this apparatus the slide piece is placed to the latitude, and the shadow of the stile made to fall upon the hour, the discrepancy between the dumb card and the needle card is then noted.

[Printed, 9*d*.]

A.D. 1855, March 17.—N° 598.

PETITJEAN, Tony, and PÊTRE, Louis (*a communication*).—(*Provisional Protection only*.) "Certain improvements in the "manufacture of daguerreotype plates and of electro-plated sheets "of metal, part of which improvements may be applied to the "production of polished surfaces on metallic articles."

This invention "consists of the following method for giving a "perfectly smooth and polished surface to the plates or sheets of "electro-plated copper."

A piece of glass, or other suitable substance, of the size and configuration of the copper-plate to be produced, is coated "with "a solution of a metallic salt," or prepared "in any other "manner that may render it fit to receive the action of the gal-"vanic battery." The piece of glass, thus prepared, is electro-silvered, then electro-coppered to the required thickness. Instead of copper, iron may be used to thicken the plate, or many layers of different metals may be electro-deposited upon it.

The "method of giving several layers of metal" is thought "especially useful for daguerreotype plates, as such plates would

"form a kind of voltaic pile, and render them more sensible to "the chemical action to which they are afterwards exposed."

"By using proper moulds, metallic articles may receive a high "polish by the above-described process."

[Printed, 3d.]

A.D. 1855, March 17.—N° 602.

JOHNSON, JOHN HENRY (*a communication from Louis François Clement Breguet.*)—(*Provisional Protection only.*) "Improvements in steam-pressure and other indicators."

This invention consists of the application of electricity to "Bourdon's manometer," for the purpose of sounding a bell or gong at a certain maximum and minimum pressure. In order to make electric contact, a second needle is placed behind the dial case, and makes contact with suitable springs, whose position is adjustable by set screws.

This principle may also be applied to alarum vacuum indicators, water indicators, and other purposes.

[Printed, 3d.]

A.D. 1855, April 2.—N° 735.

FRIEND, GEORGE WILLIAM.—"Improvements in umbrellas "and parasols."

This invention relates to "coating steel ribs of umbrellas and "parasols with other metals," to prevent "corrosion from the "action of the atmosphere and wet," and to enhance "the appearance of the umbrella."

The steel ribs may be coated with metal "by the ordinary process of tube drawing," but it is preferred to apply the coating "by electrical deposition."

In the Provisional Specification it is proposed also to cover "the "stretchers of umbrellas and parasols by drawing metal tubes "thereon," and to "apply a coating of gutta percha to the ribs "and stretchers of unbrellas and parasols."

Silver and gold are preferred to be deposited by "the galvanic "battery." "In this case the ribs are in a comparatively finished "state before applying the coating," and a coating of copper is first applied, then "a coating of silver or gold;" or the ribs may be tinned "by the ordinary process of tinning," and

subsequently coated with "copper and silver by electrical de-"posit."

The electro-coppering is preferred to be performed by means of a "cyanide solution."

[Printed, 4d.]

A.D. 1855, April 3.—N° 739.

CHAPMAN, HENRY.—"An improved electro-mechanical ap-"paratus for supplying and adjusting the electrodes used in the "production of the electric light."

This invention relates to supplying and adjusting one or both the electrodes by means of a brake wheel, its brake being controlled by the same electric current that produces the light.

The following applications and modifications of this invention are described and shown:—

An apparatus with vertical electrodes.—In a wooden box supporting the pillar, bracket, electrode holders, and electrodes of the instrument a brake wheel is mounted in bearings. The axis of the brake wheel also carries a barrel, round which is wound a chain in connection with the upper electrode by means of a sliding weight that descends unless stopped by the brake. One electro-magnet is used to actuate the brake, another to act upon a sliding rod attached to the lower electrode against the force of a helical spring that raises the electrode when no current passes. On the connection of the galvanic battery or other source of electricity to the instrument the brake fixes the upper electrode, and the lower electrode is drawn downwards as soon as a sufficient electric current is established. The upper electrode holder may either consist of long clips, extending downwards from the bracket in a cylindrical sheath, or of short clips supported in a square sheath; springs fastened to the sheath press upon the clips.

An apparatus with horizontal electrodes.—In this instance a rack and pinion is used, a chain and barrel, in connection with a weight, giving the longer electrode a tendency to advance, unless controlled by the brake. A bent-lever armature is used to the adjusting electro-magnet of the short electrode.

Giving both motions to one electrode.—The chain from the brake axis passes round a pulley having its axis on the lever armature

of the second adjusting electro-magnet. The motion of the pulley, on the excitement of the magnet, raises the electrode after its fixture by the brake electro-magnet. The lower electrode is fixed in this case.

Keeping the position of the light constant.—This may be done by clockwork, so as to raise the lower electrode at the same rate that it is consumed. In the case of the adjusting and supplying motion being given to one electrode, the other may be moved up as it is consumed by spur gear connected with the brake spindle. When the supplying motion is applied to the upper electrode and the adjusting motion to the lower electrode (as in the apparatus first described), the axis of motion of the adjusting lever is on the brake spindle. The adjusting lever itself carries spur wheels in gear with a pinion on the brake spindle and with a rack on the lower electrode holder; the effect of this arrangement is, that each time the upper electrode descends, the lower electrode ascends to meet it.

Other suggestions respecting details are made.

[Printed, 1s. 5d.]

A.D. 1855, April 11.—N° 795.

OUDRY, Léopold, and OUDRY, Alphonse.—"Certain im-"provements in preserving wood, metal, and other substances."

This invention relates to various applications of electro-metallurgy.

Articles of cast or sheet iron are covered "with a layer of metal "to protect the same from destruction." Large articles are "covered with a coat of copper, zinc, lead, or other metal," by coating each part separately, and also coating the rivets. "The "second heads of the rivets made by rivetting are submitted" to the various operations by which the separate parts are first covered; either "local baths" are used to coat the rivet heads, or the article (entirely finished) is placed in the different baths, or, if large, baths are constructed round it.

If the article is capable "of containing a liquid bath," the pieces are set together, and the second rivet heads covered, inside the work.

The bodies of vessels are covered by operating "upon the whole "piece when entirely finished without any deposit being pre-

"viously made upon the separate parts." By means of basins and lock gates they can be submitted to the action of the various baths. This part of the invention is applicable "to covering the "wooden hulls of vessels, the wood-work for gates of sluices, "jetties, and reservoirs."

The invention also consists of "the partial application of a thick "layer of zinc by means of electricity upon non-zinced rivets "uniting pieces zinced in a bath of molten zinc."

[Printed, 4d.]

A.D. 1855, April 11.—N° 806.

HJORTH, Soren.—"An improved magneto-electric battery."

A series of coiled armatures, "in a wheel revolving at a slow "motion are brought in succession between the poles of per-"manent magnets and the poles of a series of electro-magnets, "surrounded with spiral" [helical?] "rings or coils of copper "wire, within cylinders also coiled with wires."

In the Drawings the armatures are shown having "false poles" "pointed and chamfered off at the points of separation, whilst the "false poles" "of the fixed magnets are inlaid with brass plates" "at the points of separation." A "commutator" is fixed on the armature axis.

"The action of this battery is as follows:—The permanent "magnets acting on the armatures brought in succession between "their poles induce a current in the coils of the armatures, which "current, after having been caused by the commutator to flow in "one direction, passes round the electro-magnets, charging the "same and acting on the armatures. By the mutual action "between the electro-magnets and the armatures an accelerating "force is obtained, which in the result produces electricity greater "in quantity and intensity than has heretofore been obtained by "any similar means."

[Printed, 6d.]

A.D. 1855, April 11.—N° 807.

HJORTH, Soren.—"An improved electro-magnetic machine."

This invention relates to certain improvements in "producing "the length of stroke" requisite in reciprocating electro-magnetic

engines, and consists in obtaining "continuation of action" by "combining a series of hollow electro-magnets, having their poles "in opposite directions, with a series of annular projecting sur- "faces within them in metallic connection with the bows of such "electro-magnets, and arranged so as to act in succession upon a "moveable compound electro-magnet, and thereby produce a "stroke of a length sufficient for practical purposes."

The Drawing shows a pair of horizontal cylinders and pistons connected with a fly-wheel shaft, and having a commutator thereon for suitably changing the current round the pistons. The cylinders consist of the above-described hollow magnets and annular projections, and the pistons of a compound bar electro-magnet whose acting poles form a ring in its centre. "A sliding apparatus," connected with the crank shaft by an excentric, charges the stationary electro-magnets in succession; between the conducting pieces of this apparatus metal of inferior conducting power is placed, to prevent the injurious effects of the spark.

"The action of this engine is as follows:—The extreme electro-magnets being respectively charged, so that one is neutral," [has similar polarity?] "while the other has a dissimilar polarity, the "moving compound electro-magnet will be attracted to the next "series of electro-magnets charged in like manner while the pre- "ceding are discharged, and so on in succession, the return stroke "being performed in the same way, the current round the move- "able magnet having been in the meantime changed by the "commutator on the shaft."

"In the above arrangement, the secondary current induced in "the coil of the neutral electro-magnet passes in the same direc- "tion as the battery current, thus assisting to increase the "power."

[Printed, 6d.]

A.D. 1855, April 11.—N° 808.

HJORTH, Soren.—"An improved electro-magnetic machine."

A rotary electro-magnetic engine is described and shown, in which "a series of hollow square electro-magnets" are arranged in a metallic ring, and used in combination "with revolving arma- "tures shaped so that their surfaces receive a direct action from "the poles of the electro-magnets in succession."

In the Drawings the armatures are shown mounted on "carriers" affixed to the centre driving shaft; the armatures have also a rotary motion about their own centres, which revolve at the extremities of the "carriers." A concentric series of metallic surfaces, separated by pieces of metal "of inferior conductability" fixed to the frame of hollow magnets, act as a commutator, the electric current being conveyed in succession to the electro-magnets by as many conducting arms as there are armatures passing over the metallic surfaces. "The armatures are adjusted and maintained in their "proper relative position by a series of cranks and connecting "rods."

The portions of metal of inferior conducting power in the commutator are to prevent the injurious effects of the spark.

[Printed, 5*d.*]

A.D. 1855, April 16.—N° 834.

HOLMES, Henry.—(*Provisional Protection only.*) "Certain "processes of treating the human body by gases, vapors, & elec- "tricity, & for certain apparatus for obtaining and applying the "said gases, vapors, and electricity to the above or any other "purposes."

This invention consists:—

1st. "In the processes of treating the human body by partial and "entire immersions in any gases or vapors possessing a medi- "cinal or agreeable influence when imbibed through the pores of "the skin, or otherwise, while the electrical condition of the "body is, if necessary, suitably modified."

2nd. "In an apparatus to be called the pneumatic bath, in con- "nection with and by means of which the said gases, vapours, "and electricity may be obtained, and subsequently applied to "the above mentioned or to other purposes. And in connection "with the said pneumatic bath," tubes are employed "of india- "rubber or gutta percha, and especially of the vulcanized gutta "percha for the production of which Letters Patent have been "obtained by William and James Ryder, and which substances" are preferred to be employed "in the said pneumatic bath for their "electric properties."

[Printed, 3*d.*]

A.D. 1855, April 19.—N° 875.

JOHNSON, John Henry (*a communication*).—This invention relates to the "manufacture of articles of hard India-rubber or " gutta percha, or compounds thereof," and to "coating or " covering articles with the like materials;" amongst other things, telegraph wire is mentioned in the Specification.

" It is proposed to cover with pure india-rubber or gutta percha " metals, wire, or iron tubing, whether for telegraphic purposes or " for harness or carriage ware, and for the lining of reservoirs, and " for any other purpose where it is desired to protect the object " from rust, or from the action of acids, the material being sub- " mitted to the process of hard vulcanization in a sulphur bath; " or the articles may be plunged into a solution of india-rubber or " gutta percha formed by the carburet of sulphur, or into any " other solution of india-rubber or gutta percha, and then vulca- " nized hard."

The process of "hard vulcanization" consists of submitting the article to a high degree of heat and pressure.

The following Patents are referred to in the various applications of this invention:—N^os 9952, 11,032, 11,135, and 11,455, of the Old Law; N^os 752 and 1819 of the year 1854; and N^os 506 and 855 of the year 1855.

[Printed, 4*d*.]

A.D. 1855, April 21.—N° 899.

EDWARDS, William Alexander.—(*Provisional Protection only.*) " Separating certain metals from metallic substances."

This invention consists in the application of an electro-magnet to the separation of iron and steel from ores and compound metals. " A revolving bar, cylinder, or other piece of iron" is placed " in the centre of a coil or coils, the end of which projects " and is placed in connection with an electric battery or batteries. " By bringing the metallic filings into juxtaposition" with the temporarily magnetized bar, the iron and steel is "attracted " thereto, and effectually separated from the other substances."

[Printed, 3*d*.]

A.D. 1855, April 28.—N° 960.

PACKMAN, Frank James Wilson. — This invention is entitled "Improvements in projectiles, in projectile instruments, "and in the means of charging the same;" and it relates (amongst other things) to discharging hollow projectiles, filled with compressed explosive gases, by means of electricity.

The Complete Specification alludes to this application of electricity in the following words:—

"The gases are fired by caps or electricity from a battery placed "in the butt, or by means of sponge platinum fixed in the plug "or elsewhere."

No further allusion is made to the means of exploding the gases by electricity.

[Printed, 1s. 4d.]

A.D. 1855, May 1.—N° 976.

BOYD, James Edward.—This invention is entitled "A ships' "course indicator or exhibitor, for the purpose of exhibiting to "the helmsman and others in a legible manner the course which "a ship is to steer, as well as for certain improvements in ships' "compasses."

The first part of the invention relates to exhibiting the points of the compass so as to signify the direction in which the ship is to steer. In this instrument a dial or other contrivance is brought into such a position in respect to the lubber's line that the direction or course is in a line with or indicated by it.

Instead of the usual system of boxing the compass, the points between the cardinal points are respectively numbered from one to seven; the north and south points being taken as the starting or zero points.

The local attraction is prevented from exerting an influence over the compass needle by attaching "magnets or certain pieces of "loadstone, iron, steel, or other metal" to or in proximity to the compass or binnacle.

"The magnet or loadstone of the compass is to be composed of "wholly or in part of steel, iron, or other metal, and made in a "spiral or other form, either tapering off from the centre to both "ends or poles of the magnet or otherwise."

[Printed, 3d.]

A.D. 1855, May 4.—N° 998.

LACASSAGNE, JOSEPH, and THIERS, RODOLPHE.—"An "electrometric regulator, for electric telegraphing, lighting, and "electro-motive purposes."

This invention "relates to an apparatus for rendering electric "currents regular and constant, whatever may be the variation in "the battery employed;" also to regulating and indicating the amount of electricity "expended upon any kind of work."

A voltameter and electro-magnet are included in the electric circuit to be kept constant or regulated. The platinum plates of the voltameter are attached to a bell glass for receiving the mixed gases, and the whole is immersed in a vessel containing acidulated water; the bell glass or gasholder rises with the evolution of the gas, and proportionately raises the platinum plates out of the acidulated water; the gas-meter bell has its pressure on the gas regulated by a counterpoise, and has a tube passing to a pneumatic trough and graduated test glass. The armature of the electro-magnet moves on a centre, and acts as a valve to a tube proceeding from the voltameter; a reaction spring and scale adjusts the power of the electro-magnet to keep the tube closed.

When an electric current passes through the above-described apparatus it raises the platinum plates of the voltameter, thereby causing the valve of the electro-magnet to let out the gas until the plates are immersed sufficiently to shut the valve; the tension of the reacting spring thus regulates the battery power. To prevent the continual action of the spring on the armature, a tap is minutely adjustable so as to let out the gases in the same quantity that would be let out by the oscillations of the armature.

[Printed, 10*d*.]

A.D. 1855, May 7.—N° 1011.

BALESTRINO, HENRI, Marquis de (*a communication*).—(*Provisional Protection only.*) "Improvements in obtaining motive "power by the aid of explosive gases."

This invention is carried out "by inserting alternately at each "end of the cylinder containing a piston a small quantity of "mixed gases, and exploding the same by means of a current of "electricity from a galvanic battery," the piston will thus "be "driven alternately from end to end of the cylinder."

A certain proportion of atmospheric air and hydrogen gas is used, and admitted to the cylinder by means of cut-off valves at each end.

"A suitable arrangement of mechanism is employed for making "and breaking the electric circuit, and thereby ensuring the ex- "plosion of the gases immediately the supply is cut off from the "cylinder."

[Printed, 3*d*.]

A.D. 1855, May 10.—N° 1050.

LEWIS, JOHN WILLIAM.—(*Provisional Protection only.*) "Im- "provements in lightning conductors."

This invention "consists in the employment of a flat copper "wire rope, formed of three or more strands, each strand being "composed of two or more wires."

[Printed, 3*d*.]

A.D. 1855, May 14.—N° 1091.

NEWALL, ROBERT STIRLING.—"Improvements in apparatus "employed in laying down submarine electric telegraph wires."

This invention consists in a certain method of stowing telegraph cables in ships' holds, and of paying them out therefrom.

The cable is coiled round a cone, so that, in being drawn off the coil, it is prevented from kinking by means of the cone.

Supports, placed cylindrically outside the coil, prevent it from shifting in its place.

When the cable is to be laid down, a "conoidal" apex or top is placed over the cone, and around this apex several rings of iron or other metal are suspended by means of cords, "so as to admit "of adjustment at various heights over the cone." "The use of "these rings is to prevent the bight of the rope from flying out "when going at a rapid speed, and the combination of these parts "of the apparatus prevents the wire or cable from running into "kinks."

The cable is coiled round the cone in horizontal layers, always beginning from the outside, and coiling towards the cone.

In paying out the cable the end is led up through the rings over a pulley placed over the centre of the coil, and round the break wheel or wheels, over the stern of the vessel to the shore, where it

is made fast. "The vessel then goes ahead, and the wire is drawn "from the coil, sufficient friction being applied by the handle of "the break wheel or wheels to keep the wire or cable tight."

[Printed, 8*d.*]

A.D. 1855, May 23.—N° 1165.

SMITH, WILLIAM (*a communication from M. Adolphe Lethuiller Pinel*).—" A safety apparatus for steam boilers."

This invention principally relates to the application of magnetic force to indicate the height of water in steam boilers, and to call attention to the maximum and minimum levels of the water, by admitting the steam to a whistle in the form of an ordinary "throat," "whip," or "dog" whistle.

To a hollow metal float is attached a rigid rod passing through the boiler to a steam-tight case; a powerful magnet, attached to the top of the rod, carries an iron or steel needle, on the outside of the case, with it. A suitable scale being graduated on the outside of the case, the position of the needle indicates the height of the water.

A spring valve is attached to the top part of the case, which is opened mechanically by the magnet when the water is at its maximum or minimum level. For this purpose the tail-piece of the valve is risen by the contact of the magnet with the bent arm of a lever, or with a rod at the other end of the lever. By the opening of the valve a "throat" whistle is sounded.

In this apparatus no gland or packing is used to the float rod.

All other openings but this may be dispensed with, for in addition to the above-described apparatus, safety or other valves, pressure gauges, or similar apparatus, may take their steam from the same opening.

[Printed, 7*d.*]

A.D. 1855, May 26.—N° 1199.

HARRISON, CHARLES WEIGHTMAN.—" Improvements in "metal ropes, cables, and rods, and in machinery for manufactur- "ing the same," consisting:—

1st. In forming ropes and cables (electric telegraph and others), "solid or hollow, of a number of angularly-shaped plates or strips

"placed together side by side upon a core and parallel there-"with."

"Each of these strips in its transverse section forms a sector of "a circle, the angles of two of its opposite sides being either radial "lines from a centre or central core, or forming a tangent thereto." A coating of fibrous material is laid round the strips so placed, and over this one or two narrow flat ribbons, "so as to form spirals" [helices?] "approaching to a right angle with the axis of the core."

The ropes or cables are joined together by means of a socket divided diametrically into two parts, the said parts having suitable flanges to permit them to be bolted together. "The interior of "the socket is formed with suitable projections, which fit into "groves" [grooves?] "cut around the parallel strips near the end "of each rope, between which a projection also meets closely "around the united part of the central core."

2nd. In constructing metal ropes (electric telegraph and others) of ribbon metal instead of wires.

When a flexible rope is desired, not more than two ribbons are coiled in short "spiral" [helical?] convolutions round the core. Two layers are used, coiled in opposite directions, and having a fibrous coating between the layers.

When ropes or cables of this description are used for subterranean communication without pipes or troughs, the core of the rope, or each insulated wire, is enclosed in a lead pipe "previous "to winding around the metal ribbon."

When a telegraph cable capable of bearing tension, and of nearly equal flexibility to that just described, is to be formed, strands of wire are enclosed in the core; the insulated wires are placed in the intervening spaces between the strands. The strands may be either laid in the core without twist, or the strands and insulated wires may be twisted together in the manner of a common wire rope; during the process of laying them together, however, a much greater degree of tension is applied to the strands than to the insulated wires. By this means the insulated wires are protected from extreme tensile force in the laying down, or otherwise. The cores, thus made, are then covered with metal ribbon, as above described.

3rd. In manufacturing solid and hollow metal rods, by employing the sectorial rods or strips described under the 1st head.

4th. In improvements in machinery for manufacturing the cables described under the 1st head of the invention. The core of the

cable is drawn off a reel, and passes through a guide plate (through which the strips are drawn); then through a funnel-mouthed tube, which brings the strips together in a cylindrical form; then through the hollow axis of a disc carrying the reels that supply the "spiral" [helical?] wrapper and (by gearing and conical pullies) wind it round the strips. The cable is then passed through similar apparatus, to receive as many coatings as may be desired. By alternately crossing the straps of the conical pullies, each successive coating is laid in an opposite direction; the speed of the discs is varied, to suit the width of the ribbon, by means of the conical pullies. The parallel strips are drawn from reels mounted parallel to their position in the cable.

[Printed, 7*d*.]

A.D. 1855, June 4.—Nº 1268.

GODEFROY, PETER AUGUSTIN.—" Improvements in the treat- " ment of gutta percha," which are applicable, amongst other uses, to "*covering or insulating the wires of electric telegraphs*."

This invention "consists in combining the shells of the fruit of " the cocoa nut tree (cocos nucifera) in a finely ground or com- " minuted state with gutta percha in the manufacture thereof."

This invention is carried into effect as follows:—" The cocoa " nut shell (which should be free from fibre and not damaged by " sea water) is first broken into small pieces by any suitable " means, and then well dried; after which it is passed between " powerful crushing rollers, from whence it comes in thin flakes, " said flakes being ground in a mill as in grinding flour." The cocoa-nut powder thus produced is divided into three degrees of fineness. The first or finest quality is used in the gutta percha employed for covering or insulating telegraph wires. To produce the proper degree of fineness, the pulverized cocoa-nut shell is sifted through sieves.

" The cocoa nut powder" is "added to the gutta percha when " it is in the last state of finishing in the masticator or otherwise," and should be well "and thoroughly amalgamated therewith."

[Printed, 3*d*.]

A.D. 1855, June 4.—Nº 1270.

KAYE, HORACE JOHN, and BURRELL, PERCY. — "An " improved mode of communicating to each of two trains

" that are in motion the distance they respectively are from each
" other."

The nature of the invention is as follows:—"The application of
" electro-magnetism to the liberation, and thereby raising of a rod
" and guide rail placed on the line of railway to a height varying
" with the distance between the trains, and which height is in-
" dexed on the engine, for the information of the engine driver, or
" other person in charge of the train."

A number of insulated line wires, one to each train whose position is to be indicated at any one time, are laid along a line of railway, and an electric current is kept flowing through them. Signal or index boxes are placed at given distances along the line, the line wires being in connection with them. When a train passes along the line, a roller carried by the tender depresses a rod in each apparatus in succession, thus breaking the circuit; this breakage of circuit only acts upon those boxes in the rear, or that have been already passed over by the train, in consequence of the circuit of those in advance being completed by one of the other line-wire circuits not broken by the passage of the on-coming train. Each time the train passes a signal box, the rods of all those in the rear that have not been depressed by the passage of a later train, are risen by the action of the breakage of the electric circuit on an electro-magnet; on any train passing a signal box, the height of the rod therefore indicates the distance of the train in advance. The raising of the rod to increasing heights may either be made to index the distance of the train in advance upon the engine of the passing train, at the side of the line of railway, or at railway stations.

The following apparatus are described and shown:—

The index or signal boxes along the line. A signal rod is capable of vertical movement in a suitable case, and has a constant tendency to rise imparted to it by a helical spring. The lower part of the rod carries notches in which an "escapement" works; the escapement pallets are attached to the armature of an electro-magnet, and prevent the rod rising more than a certain height each time the electric current round the electro-magnet is interrupted. To make the necessary breakage and change of circuit on the depression of the rod by a passing train, a "paul" on the rod moves a ratchet wheel carrying on its axis a suitable cam wheel; the cam wheel acts upon the hinged and tailed ends

of the line wires, so as to suitably break and complete connection with the fixed terminals of the electro-magnet.

"The centre guide" rails placed over the signal rods. A hinged rail is supported by sleepers, and has the free end resting on the top of the signal rod. A wheel, firmly attached to the end of the tender, depresses this lever on the passage of a train.

"Indexing apparatus" placed on the engine of the passing train. A rod, free to move in a vertical direction, carries at its lower end a spring-lever and wheel. When the train passes a signal box, the "centre guide rail" acts upon the wheel, thereby raising the rod and causing an index hand at its upper end to show the relative height of the signal rod on a suitable dial-plate.

An index for the side of the line of railway. A horizontal wheel at the end of a rod attached to the train strikes an arm projecting from the signal box, which depresses a signal rod by means of a cam on the arm axis. The rod acts on a long lever, which depresses the indexes or arms raised by the train in advance.

A registering index for stations. The position of a train at any time is registered on ruled paper (rolled round cylinders) by markers which are moved across the paper by the rising of the signal rods; the cylinders revolve by clockwork in a given time.

"By a simple modification of the afore-named system, trains " may be made to actuate indexes in advance of them." "This " variation is of importance on single lines of railway."

"Instead of keeping an electric current flowing through the " main wires," the circuit may be in general broken, but completed by a train passing over an index box.

In the Provisional Specification it is stated that when the signal rods do not reach a given height on the passing of a train, an arrangement may be made by which the steam may be mechanically shut off.

[Printed, 2*s*. 2*d*.]

A.D. 1855, June 5.—N° 1276.

PULS, Francis.—" Improvements in electro-coating iron."

This invention relates to coating iron with zinc by electro-deposition. The process is as follows:—

The iron is first cleansed " in the common way in diluted acids"

and washed with water, thus "leaving the surfaces thereof rough;" no sand scouring is used.

The articles of iron are then electro-coated by means of an electric current, which is "so regulated that the resistance against "the electric current in the bath in which the articles are placed or "immersed may be rendered equal or nearly so to that in the "battery; to obtain which effect the surfaces of the effective or "active sides of the positive plates of the battery should be equal "or rather greater that" [than?] "the surface of the articles to "be coated, otherwise the deposit of the zinc upon the iron will "be but slow and uncertain, and the articles rendered rough and "unservicable." The regulation, in the above-described manner, of the amount of electricity, causes the zinc deposit to be in "the smallest possible atoms, thereby securing a perfect adhesion "of the zinc to the iron." The battery is excited by a weak solution of sulphuric or hydrochloric acid, or by a solution "of "hydrochlorate or sulphate of soda, or potash, or ammonia and "water."

The depositing solution consists of "a weak solution of the "sulphate or hydrochlorate of zinc, or double or treble salts of "the same, with potash, soda, and ammonia."

The exhausted fluid from the bath may be re-used in the battery, and that from the battery may be re-used in the bath.

[Printed, 3*d*.]

A.D. 1855, June 9.—N° 1318.

VARLEY, Cromwell Fleetwood.—"Improvements in electric "telegraphs."

"This invention consists of improvements whereby the speed of "transmission is increased, and the distance of direct communi- "cation extended, especially in the case of very extended sub- "marine lines. The improved apparatus are less liable to "derangement from atmospheric and other causes, are applicable "to all kinds of telegraphic conductors, and refer chiefly to "systems which are actuated by local circuits."

The improvements are as follows:—

An improved electro-magnet for relays.—The coil is wound on a reel of soft iron, over each end of which a hollow "casing" or cap of soft iron is fitted. The wire coil is thus almost completely encased with soft iron, and the magnetic polarity is developed at

the inner ends of the casings, which for that purpose do not quite meet, but leave the central portion of the coil exposed.

Relays for completing local circuits.—A magnetic "piece" or "armature" is suspended so that its crescent-shaped end may be deflected by the action of both poles of the above-described electro-magnet whenever a line-wire current excites it; stops are placed to limit the extent of deflection of the magnetic "piece," which also serve to complete local circuits by means of suitable electric connections.

A "Baine's" [Bain's?] machine is represented as being worked by a "single relay" (*i.e.*, one that only completes a single local circuit), the above-described arrangement, with one armature suspended above the electro-magnet, being used.

When "two local circuits are to be actuated" respectively by a positive and negative line-wire current, a second "crescent-ended" magnetic "piece" (suspended under the electro-magnet) is used.

In either relay, when inactive, the magnetic "piece" (or "pieces" in the second instrument) is kept in contact with one of its stops by means of adjustable helical springs, which also keep it against its bearings. The magnetic "piece" may either be a permanent magnet or magnetized by induction from a large permanent magnet. A small needle magnet may be mounted on an axis near the end of the electro-magnet, to "call attention when currents "are passing."

The "single relay" may be substituted for the Patentee's "galvanometer relay patented in 1854." (See N° 371, 1854.)

In the Provisional Specification, in relation to this portion of the invention, it is also stated that "one portion of the magnet "may be made moveable, so as to attract or be attracted by the "other portion of the magnet."

The manufacture of permanent magnets.—Water from an elevated cistern is forced past the red hot steel bar, when it is made the core of an electric helix with an iron exterior casing, thus hardening the bar and magnetizing it at the same time. It is preferred to heat the pieces of steel intended for permanent magnets to a bright red heat in a crucible of animal charcoal, they "having "been previously wetted with a solution of ferrocyanide of "potassium."

The key used for working by means of the Patentee's "translator" (see below) into "the Morse's system."—In this key, when in a

state of rest, the line-wire circuit is completed through a relay by means of a tail-piece to the key-lever, which rests on a stop; the metal key-lever being connected to the line wire and the stop to the relay. A small " contact lever " is jointed (by spring cheeks) on to the fore part of the key-lever, and acts against stops, by which means, when the key is depressed, it puts the line wire into circuit with the most intense of two batteries, each of which are in connection with the earth. On the rising of the key the circuit of the larger battery is broken, the smaller battery sends an opposite current through the line wire, and, finally, the line-wire circuit is completed through the relay.

When the key-lever is quite depressed and the line wire is being charged by the larger battery to signal at the distant station, the tail of the key-lever comes in contact with one terminal of a resistance coil, the other end of which is in connection with the earth. " This coil consists of a great length of fine iron wire, offering " great resistance to the passage of electricity, and is employed to " equalize the amount of charge which the wire receives for " different durations of the time of contact in making dots and " dashes."

" *Translators.*"—This name is given to " the apparatus used " for bringing fresh batteries into play to enable correspondence " to be maintained direct between stations whose distance apart " is too great to admit of connecting the wires into one continuous " electrical circuit; " "translators" also serve to "translate" from one system of telegraphing to another.

The following difficulties are obviated by the use of the " im- " proved translators:"—The shortening of the short marks or " dots " (made by a marking telegraph) by repeated translation; this effect occurs in consequence of the time required to magnetize the electro-magnets and to move the armatures; it is also owing (in the case of submarine telegraphs) to the wire not being fully charged by the momentary depression of the finger key at the transmitting station. The lengthening of the long marks or " dashes " in submarine telegraphs; the first dash may give so great a Leyden-jar charge to the wire that its effect may not subside during some few subsequent contacts at the transmitting station, and thus make a dash and series of dots appear at the receiving station as one long dash. The discharge of the Leyden-jar charge (in the case of submarine telegraphs) by and through

the relays; this may either take place through the receiving relay, after a signal has been given and the line-wire circuit is connected with the said relay, thus inducing so much permanent magnetism in its electro-magnets "as to derange it from printing "with the weak currents from the distant station," or (in the case of a "translator" placed between two submarine circuits) from the second circuit to the first, and from the first to the second, and so on alternately (through the respective relays), until the exhaustion of the batteries.

"From the foregoing causes the translating apparatus of Stein-"heil" "is not applicable to submarine wires of greater length "than one hundred miles."

"The following cases" of the application of "translators" are set forth in the Complete Specification:—

1st. The extension of the Patentee's system, patented in 1854. (see N° 371, 1854,) "by the means of translation."

(N.B.—In the system patented in 1854, "a current is continually "flowing through the line during transmission of a despatch, the "positive current producing the signals, the negative current "the intervals.")

Three kinds of relay translators are described at length and shown, and the method of using them set forth. The instruments and their action may be shortly described as follows:—

First arrangement.—Two relays, somewhat similar to those already described, are used. To adapt them for working together, so as to translate either positive or negative currents from the first line-wire circuit to the second line-wire circuit, or *vice versâ*, the magnetic "piece" or armature has its fixed studs respectively connected with opposite poles of two separate galvanic batteries, their other poles being connected with the earth; also a pivoted armature of soft iron is mounted under the electro-magnet in connection with a reaction spring, in such a manner that the passage of a line-wire current through the electro-magnet's coils in either direction merely *attracts* the armature towards it (instead of *deflecting* it), thereby moving its tail in the same manner, whether a positive or negative current excites the electro-magnet. Only one relay is brought into action by one line-wire current, the other relay merely serving (by means of its lower armature) to conduct the current to the acting relay. The magnetic "piece" or upper armature serves to translate a current of the same name from one

circuit to the other, and the lower armature keeps the acting line-wire circuit closed in the direction desired for correspondence, it being broken in the other direction. The course of the line-wire current, therefore, is through the lower armature of one relay and the coils of the other back to the transmitting station via the earth, and a current of the same name is translated to the second line-wire circuit by one of the batteries of the relay whose electro-magnet is active, the battery called into action, and therefore the direction of the translated current being dependent upon the direction of deflection of the magnetic " piece," which direction is itself dependent upon the direction of the first line-wire current. When the current through one line wire ceases, the lower armature of the previously acting relay connects up the other line-wire circuit, " and then communication can be carried on in the oppo-" site direction."

Second arrangement.—One relay is used in conjunction with other apparatus. The relay is exactly similar to the " single " relay " employed to complete local circuits, and has only a magnetic "piece," which makes the requisite connections with opposite battery poles, as in the first arrangement. The additional apparatus consists of two instruments, each of which is composed of the following parts:—A horseshoe electro-magnet having a soft iron armature free to vibrate by the side of the electro-magnet's coils on a horizontal axis; to the armature are fixed "platina" points which dip into mercury cups. The two additional instruments keep the desired circuit closed during the time of communication, as they act conjointly on exactly similar principles to the lower armatures in the first arrangement, so far as the closing and breaking the respective circuits is concerned.

Third arrangement.—The peculiar advantages of this arrangement are:—That positive and negative currents can be translated in either direction without disconnecting the line wire; that the needle telegraph can be used; and that the loss owing to wet weather, in overground circuits, can be compensated for. A relay is used somewhat similar to that employed to actuate two local circuits respectively by a positive and negative line-wire current; the electro-magnet has, however, two coils, one in the reverse direction to the other, and only one stud of each pair completes circuits, the remaining studs being merely stops. In conjunction with the relay there is a galvanometer with two coils (one in the reverse direction to the other) and water-resistance tubes connected

with the earth. A current traversing the first circuit passes through one coil of the galvanometer, one coil of the electro-magnet, returns through the reversed coil of the electro-magnet (thus adding to its power and deflecting one of the two magnetic "pieces"), then traverses the reversed coil of the galvanometer (thereby deflecting its needle), through the adjusted earth circuit to the transmitting station. The deflection of the magnetic "piece" causes one of the relay batteries to be included in the second circuit, to whose current is added that portion of the first circuit's current that does not pass through the water-resistance tubes to the earth return-circuit and transmitting station. The galvanometer, in conjunction with the water-resistance tubes (resistance coils may be used instead), enables the resistance of the first and second circuits to be adjusted and equalized.

2nd. Translating from the Patentee's system into Morse's, and *vice versâ*.

In this case the double alternating current of the Patentee's system is translated into the single current necessary to work the Morse machines; and, *vice versâ*, the single current of Morse is translated into the Patentee's double alternating current. The receiver is able to stop the sender during the transmission of a despatch.

The translating apparatus used consists of three ordinary horse-shoe electro-magnets with pivoted spring armatures, each having circuit-completing stops and studs both above and below the centre of motion; two relays, one to the double-current circuit, and one to the single-current circuit; two line-wire batteries, one of which serves to work the single-current circuit, both being employed to work the double-current circuit; and a local battery to excite the electro-magnets of the translator according to the direction in which signals are being conveyed, and to actuate a Morse machine, which may be included in the circuit when required.

In the normal condition of the apparatus one electro-magnet is ready to be excited, when its relay is put into action, for translating from the double-current circuit to the single-current circuit; and two electro-magnets are ready to be excited, by similar means, for translating from the single-current circuit to the double-current circuit.

In translating from the single-current circuit to the double-current circuit, the course of the single-current line-wire circuit is through the armature of the one electro-magnet of the translator,

then through its relay coils to the earth return-circuit. The relay armature, by means of the local battery, excites the two electro-magnets whose armatures then include the line-wire batteries for sending the double current through the double-current circuit; one battery being brought into action by the passing of a current through the single-current circuit, and the other acting for an instant on the cessation of a current in the single-current circuit. This momentary after-current is sent by mounting the armature of the first electro-magnet (by which the double current enters the machine) with a click lever, and ratchet wheel on the spindle of a fan wheel which works in a mercury trough; this arrangement enables the circuit of the smaller line-wire battery to be completed by the (already retired) armature of the second electro-magnet before the armature of the first electro-magnet has broken contact with the circuit of the line-wire battery.

In translating from the double-current circuit to the single-current circuit, the course of the double-current line-wire circuit is through the armature of the first of the two electro-magnets to its relay, thence to the earth return-circuit. The relay causes the excitement of the one electro-magnet of the translator (in the case of positive currents in the double-current circuit), thereby including the line-wire battery in the single-current circuit, and producing signals at the distant station. Negative currents in the double-current circuit do not act upon the relay armature, and therefore send no currents by the translator through the single-current circuit.

A resistance coil connects the armature of the second electro-magnet of the double-current sending circuit with the earth, by which means the charge given to the line wire of the double-current circuit is equalized throughout its length.

3rd. Translating "signals from one submarine circuit to "another submarine" [circuit?] "without inconvenience from "the induced charge."

A similar arrangement of translator, relays, and batteries to that described in the second case is used. There are, however, the following points of difference:—

First point.—Both the armatures that are in immediate connection with the line-wire circuits have click levers and ratchet wheels that work the same fan wheel in a mercury trough.

Second point.—The lower stops of the two above-mentioned armatures are both connected to the armature whose stops form the line-wire battery poles.

Third point.—The coil of the electro-magnet whose armature sends positive or negative currents along the line wire "is in circuit "with" the coils of both the other electro-magnets.

"This machine transmits alternating currents in both directions, the last current being always a positive one. The return current is also positive, and does not disturb the relays, because they complete the local circuit only when a negative current is passing."

4th. "Re-establishing the length of the dots."

In one arrangement applied to a Morse's machine the local circuit is divided into two branches, one including the relay contact, the other making contact by a "platina" wire dipping into a mercury cup, the wire being fixed to a pendulous body which continues the duration of completion of the local circuit for a sufficient time to enable a perfect dot to be made; the duration of the action of the local circuit on the electro-magnet of the Morse machine is thus made independent of the duration of the line-wire current through the relay. When the line-wire current actuates the relay, and thus completes the local circuit, the tail of the writing lever strikes the pendulous body and enables its "platina" wire to complete the local circuit by its branch until its oscillation is completed.

In another arrangement the same purpose is effected by clockwork. The writing lever, when depressed, discharges a locking piece having two stops of different radii, by means of a stud on its tail. This mechanism acts like an escapement, and, during the time that the writing lever is depressed by the action of the local current on its electro-magnet, the axle carrying the stops rotates, and, by means of a suitable cam and fixed springs, removes "the "second line wire from its relay," connects it with and disconnects it from the necessary batteries, and, lastly, reconnects it to the relay.

A finger key with a similar arrangement attached is described and shown, "to make the dots of not less than the required length "at the original station." The writing lever's electro-magnet is wound with inner and outer coils, and the inner coils are short-circuited, to prevent the over magnetization of the iron, when the writing lever's tail touches its fixed stop.

"To transmit a dispatch at the original station with perfect "regularity" a key is actuated as follows:—Suitable type are moved along against a key by wheelwork acting upon a screw

which works into a nut on the type box. The key shown in connection with this improvement has been already described.

5th. "Where the circuit exceeds more than 200 miles of sub-"marine wire."

In this case the electricity is measured out in such a way that the charge of the line wire "shall not be greater with a long con-"tact than with a short one." This can be effected by the induction plates set forth in the Specification, N° 2555 (1854).

An arrangement for effecting this purpose, "applied to a Morse's "machine for translation," is described and shown. The deflection of the writing lever's tail against certain stops and springs, by the electro-magnet which is excited by the first line-wire circuit, charges the second line-wire circuit, a quantity battery being thus connected with a primary coil whose secondary current charges the second line-wire circuit. The momentary secondary current gives a charge or tone to the wire, and the primary current (being also in connection with the second line-wire circuit during the depression of the lever) maintains the charge without overcharging the wire by the signalling of dashes. To adjust the amount of continuous charge given to the line wire, the length of the primary and secondary coils are alterable. When the signal is completed, the cessation of the current through the primary coil discharges the Leyden-jar charge of the line wire by the momentary but opposite current then excited or induced in the secondary coil.

The action of a key in measuring out the charge given to the line wire is precisely similar, except that it is moved by the finger instead of by an electro-magnet.

The clockwork dot-elongating apparatus already described can be applied to the induction-coil arrangement for long submarine circuits. For this purpose a second cam on the escapement arbor makes connection, in suitable sequence, with springs connected to an induction coil.

A method of discharging short submarine circuits of the Leyden-jar charge by the connection of an opposite battery pole with the line wire is also described and shown. The cams on the escapement arbor act upon a series of springs, so as to break the first battery connection made, and complete the opposite connection before the writing lever's tail is raised to its normal position.

An improved method of testing for faults in submarine cables.— The cable is hermetically sealed at the end and placed in lengths

in a tub, it is then charged by a frictional electrical machine. If it charges like a Leyden jar it is perfect; but if the cable will not charge and the fault cannot be found by the galvanic test, it can be sufficiently enlarged by the discharge of a large "heyden" [Leyden?] battery into the wire. By similar means, and a suitable adjustment of the universal discharger, it may be ascertained whether the conducting wire is sufficiently near the centre of the insulating medium, throughout its length, to be trustworthy.

A "printing" telegraph with two writing levers.—One lever is actuated by a positive line-wire current, the other by a negative line-wire current. The double relay and "treble" [triple?] key-board herein-after described are used with this machine. So long as the writing levers are at rest, the clockwork mechanism rotating the paper cylinder is stopped by a lever which then butts against the end of a "spiral" [helical?] groove on the rotating axis; but if either writing lever be attracted, and as long as it is attracted, the stopping lever is raised out of the groove, thus permitting the rotation of the paper cylinder; a suitable spring constantly brings back the stopping lever (when raised) to the commencement of the helix.

A marking telegraph.—Instead of using a point at the extremity of the writing lever to mark the paper, a fine "platina" wire, ignited to a white heat by a battery, burns holes in the paper. "These perforated slips can be used for repeating the dispatches "to a series of branch stations by an apparatus similar to that "used by Baine" [Bain?] "for printing from perforated paper."

The double relay as used with the "printing" telegraph.—The upper and lower magnetic "pieces" are each connected with the same pole of the local battery, and one of each pair of studs is connected to the other pole of the local battery. The completion of one of these circuits by the deflection of one of the magnetic "pieces" (according to the direction of the line-wire current) depresses one of the writing levers; the second writing lever is depressed by the deflection of the other magnetic "piece," which completes the second local circuit. The depression of the writing levers may translate currents "to more distant stations."

A "triple key board to be used with the foregoing double printing machines."—Two of the keys are used "to actuate the "double writing apparatus," the third key (put into circuit by a "switch") may be used with the Morse's system when the insulation of the telegraph line is defective.

The two first keys each consist of a tailed key-lever with front contact-piece and elevating spring; on the movement of the key-lever the tail raises a bar (common to both keys), connected to the line wire, from connection with the relay stud, at the same time the front contact-piece places the line wire in connection with one or other battery pole, according to the key which is depressed; the spring of the front contact-piece of each key is connected with one battery pole (a different pole in each key), and the remaining battery poles are in connection with the earth-plate.

The third key produces actions similar to those described in N° 371 (1854). This key is somewhat similar to the other two, but its tail depresses a spring in connection with the zinc battery pole when the key is at rest, thus sending a negative charge through the line wire except when signals are being made.

[Printed, 2*s.* 4*d.*]

A.D. 1855, June 20.—N° 1410.

WALKER, Robert, and M^C^KENZIE, Alexander.—" Im-" provements in electric telegraphs," consisting of:—

1st. Finger keys for marking telegraphs, whether the marks are made by chemical means or by a marker and electro-magnet. In these keys there is a key to each letter, and the marks representing a letter are made at the distant station by the simple touch of the corresponding key.

In the first key, a non-conducting disc, inlaid with metal surfaces according to the signs to be transmitted, is made to revolve at a corresponding rate to the "paper-receiving surface" at the distant station. The metal surfaces of the disc are in connection with one battery pole, and the metal arm of the key with the other battery pole. On the depression of the key, it moves on its horizontal axis, and a pin at its inner extremity is made to enter one of the openings in a non-conducting rim, that otherwise prevents the pin touching the inlaid portions except at the commencement of the signal; when all the requisite inlaid portions have made contact in succession with the pin, it is forced (from an opening) to the exterior of the rim by the reaction spring that lifts the key.

In the second arrangement a fork on the end of the key lever rotates a suitably inlaid cylinder on the depression of the key. The circuit is completed through the key lever, cylinder, and a fixed spring bearing against the cylinder. On letting go the key, a non-

conducting portion of the fork interrupts the circuit and brings backs the cylinder to its original position.

2nd. Introducing an indicating instrument at any part of a telegraphic line. For this purpose the two ends of a line wire are combined by a spring; a vulcanized India-rubber tube is shown. These connections are at the telegraph posts.

[Printed, 7*d*.]

A.D. 1855, June 28.—N° 1473.

MOREAU-DARLUC, Charles.—"An improved mode of separating substances of different nature or composition by means of displacement and substitution."

This invention "consists of the application to various useful purposes of the principles of forcing a jet of dilated or non-dilated atmospheric air, gas or gases, either compressed or non-compressed previously, and in a cold or warm state, to act and press in a suitable closed vessel on the liquid or menstruum with which substances from which certain soluble parts are to be abstracted are moistened or impregnated, these substances being contained in the said vessel on a perforated false bottom, and with or without the aid of a partial vacuum under the false bottom; *and also the application of electricity*, generated by any suitable means, either to the dilating of the air, gas, or gases above mentioned, or to the decomposition of certain matters, parts of which are to be forced through the substances to be treated, or to the decomposition of the substances to be subjected to this process."

No information is given as to the precise method of applying electricity to heat the liquid, air, or gases to be forced through the false bottom; but it is stated, in reference to using electricity as a decomposing agent, that it (the "electrical current") may be obtained either "from a special battery or apparatus for generating the same," or from the apparatus itself, parts of the apparatus being "made of different metals," so as to form "a galvanic battery."

The portion of this invention referring to the application of electricity is not mentioned in the Provisional Specification.

[Printed, 4*d*.]

A.D. 1855, July 10.—N° 1543.

ELKINGTON, CHARLES JAMES CHEATLEY.—(*Provisional Protection only.*) "Improvements in depositing alloys of metals."

"This invention consists in depositing alloys of metals, by em-
"ploying a bath of a solution of the metal in the particular
"alloy which is most difficult of deposition, and in supplying to
"this bath the metal or metals which are more easy of deposition
"only as they are required." This is done, "by preference, by
"placing into the bath a pole consisting of an alloy of the
"metals" it is desired to deposit; "but the metals which are easy
"of deposition may be supplied to the bath by other convenient
"means, if preferred. The article to be coated is placed in the
"bath and connected with the zinc or negative pole of the battery
"in the ordinary manner."

The invention also "consists in depositing alloys of nickel and
"silver with or without the addition of copper, zinc, or tin."

[Printed, 3*d*.]

A.D. 1855, July 20.—N° 1642.

JOHNSON, JOHN HENRY (*a communication from Andre Koechlin, Napoleon Joseph Vicomte Duchatet, and Joseph Antoine Auguste de Perpigna*).—The title of this invention is "Improve-
"ments in machinery or apparatus for obtaining motive power,
"applicable also to the raising, forcing, and exhausting air and
"other fluids, and partly to the kneading or working of dough
"or other pastes;" and the Complete Specification states that the motive power apparatus "may derive their motion either from
"water, air (whether compressed or rarified), and from steam,
"gases, vapours generally, *or electricity*." No mention, however, is made of the precise method in which the electricity is to be applied, leaving it to be inferred from the general construction of the apparatus.

The apparatus consist "of two cylinders or axes, fitted each
"with a projecting spiral" [helical?] "thread, or respectively
"with a projecting spiral" [helical?] "thread, and a correspond-
"ing spiral" [helical?] "groove, gearing or working together"
"within a suitable casing."

In another arrangement of apparatus two cylinders or axes are fitted respectively with projecting teeth parallel to their axes of

motion; such teeth having a "spiral" section, and gearing into corresponding recesses within a suitable casing.

Various arrangements of helices and spiral teeth are shown, applicable to steam, air, or water power, also to the other purposes above enumerated.

[Printed, 1*s.* 5*d.*]

A.D. 1855, July 20.—N° 1646.

DESCHAMPS, Casimir, and VILCOQ, Charles.—" A free " diving boat."

This invention consists of a submarine boat, free to move in every direction, in which the electric light is used to afford light in and around the boat.

A water-tight chamber contains the batteries, the noxious gases from which are driven out with the air vitiated by breathing, by means of bellows.

A glass chamber at the top of the lantern of the boat carries the electric light, and a reflector is placed above the light, which prevents it being seen from above, and reflects it into and around the boat.

[Printed, 6*d.*]

A.D. 1855, July 21.—N° 1649.

FONTAINEMOREAU, Peter Armand le Comte de (*a communication*).—" Certain improvements in the construction of " voltaic batteries," consisting of:—

1st. " An improved construction of voltaic battery." This battery consists of carbon and zinc, and has for its exciting fluids a mixture of nitrate of soda and sulphuric acid next to the carbon plate, and a solution of chloride of sodium next to the zinc plates

2nd. "The preservation of the parts electrotyped from the " action of acids." The upper edge of the carbon plate has a thin coating of copper electro-deposited upon it; to this edge the conductor is soldered, and the plate is fixed by cement to the upper part of a wooden frame, it is "consequently preserved from " oxidation."

3rd. " The employment of paper prepared in the same way as " gun cotton as a substitute for the porous vessel or diaphragm."

This paper diaphragm is cemented to the wooden frame containing the carbon element by means of collodion.

4th. "The mode of filling the cells with the exciting fluid and "of emptying the same." A pipe fixed along the top of the cells supplies solution to the carbon elements by means of a small tube passing through the frame; the zinc elements are supplied in a similar way with fluid from the bottom. Each pipe is fitted with a funnel for the supply, and with a non-metallic stopcock for the discharge of the liquids.

The carbon plate of each cell is placed between two zinc plates in this battery.

[Printed, 10*d*.]

A.D. 1855, July 23.—N° 1668.

ACHARD, AUGUSTE.—"Improvements in the application of "electricity as a transmitting agent of motive power."

The following are illustrations of the adaptation of these improvements:—

Employing electricity as a transmitting agent of motive power in which "an alternative circular movement" is converted into either a reciprocating rectilinear movement, or a circular continuous movement, or transmitted still as "an alternative circular movement" that can be interrupted or re-established at will.—Loose on the same fixed shaft are fixed the lever receiving motion from the prime mover and that intended to transmit the motion; the former carries at its extremity a soft iron keeper, the latter an electro-magnet. When the electro-magnet is inactive, the moving lever is merely oscillated; but upon the excitation of the electro-magnet, the transmitting lever partakes of the motion from the prime mover. At each oscillation of the moving lever its keeper is brought into contact with the electro-magnet; the keeper, however, only remains in contact when the electro-magnet is excited.

The tail of the transmitting lever is jointed by a link to a rod sliding in guides; thus a reciprocating rectilinear movement is obtained. The transmitting lever carries a spring click, which produces a continuous circular movement by rotating a ratchet wheel on another shaft. The transmitting lever itself has a circular reciprocating movement.

"*A continuous circular engager.*"—The prime mover rotates a spiral-shaped wheel of soft iron, which wheel has a "spire" at the

part of its circumference at which the larger and smaller radii of the wheel meet. Loose on the same shaft is placed a frame carrying a horseshoe electro-magnet at the extremity of a lever jointed on to the frame, the arms of the electro-magnet being radial to the wheel, but kept from contact with any part of it but the "spire" by a suitable spring. On the excitation of the electro-magnet, it comes into contact with the wheel, and at the end of one revolution a suitable projecting "piece" (fixed to the electro-magnet) comes into contact with the "spire," at the least radius of the wheel, and is carried round by it. Continuous circular motion is thus transmitted until the cessation of the electric current, when the spring withdraws the electro-magnet from contact with the wheel.

In another arrangement, adapted for high speeds, a helix is cut on the lower face of the wheel, and the arms of the electro-magnet are parallel to the axis of the shaft. On the excitation of the electro-magnet it becomes attached to the lowest part of the screw, and at the end of a revolution meets the sudden projection where the screw terminates, having been raised by contact with the face of the screw. When the electric current ceases, the electro-magnet drops in its guides and leaves the helix-faced wheel to revolve freely. In this case the shaft is supposed vertical, and the movement of the electro-magnet is perpendicular to the direction of the centrifugal force.

The electric current is conducted to either of these "continuous "circular engagers" by means of fixed metallic springs in connection with the battery poles, bearing up against metal rings, insulated from the pulley on which they are mounted, and in connection with the coil terminals respectively of the electro-magnet.

Retarding and stopping railway trains.—By an arrangement precisely similar in its general features to the first example of transmitting motive power, the rotation of the brake wheels themselves is made to actuate a brake on the excitation of the electro-magnet. An excentric on the axle of the brake wheels gives the "alternative circular" movement, and the axis of the breaksman's handle carries the ratchet wheel.

The brakes are actuated from a certain distance by an approaching train as follows:—Each train carries a galvanic battery, having its poles in a certain fixed direction in relation to the direction of motion of the train, so that by means of insulated

metallic conductors between the rails, the forces of the batteries on trains approached to within half the length of the conductors are united and actuate each other's brakes as above described, or set in action by electricity any other suitable mechanism.

Connection is made between the batteries and the insulated conductors laid along the permanent way, by means of "rubbers" balanced and jointed on to a rod fixed to one of the carriages. The conductors have grease spread upon them after the transit of each rubber by a grease box in its rear; the friction of the metallic rubber is sufficient to make a good electric contact with the conductor.

The brakes may also be actuated, within the given distance, by electric connection made at any place of danger.

"*Winding of silk from cocoons.*"—By the rupture of a cocoon thread, the mechanism instantly effects the replacement of the cocoon. The attendant on the machine has merely "to place the "cocoons upon an endless chain, and to wind the threads to a "second endless chain."

The cocoons that are supplying silk to the "winder or reel" (not shown in the Drawings) are contained in a round pan of hot water, and are arranged concentric with the centre of the pan. Each cocoon thread presses against its own "vertical swing," and all the threads converge to a point vertical to the centre of the pan where they pass through a "drawing iron," then through the hollow axle of a "little toothed wheel," they are then crossed in the usual manner and passed to the "winder or reel."

The "vertical swing" consists of a lever, against whose upper arm each cocoon thread presses, which lever is mounted upon the principle of unstable equilibrium, therefore when a cocoon thread breaks, the "swing" falls and completes an electric circuit with its tail, thus putting into action an "electric engager" similar to that explained in the first illustration of the adaptation of these improvements.

The reciprocating circular movement thus put into gear communicates a single rectilinear reciprocating movement to a bar, which moves a new cocoon thread up to the broken thread, and (by means of a small shaft at the extremity of the bar, carrying a "fork," chaps, and springs moved by jointed rods, attached at one end to the framing and at the other end to the bar) cuts the new cocoon thread, attaches it to the broken thread, and (in retiring) moves the endless chain so that another cocoon thread is borne by

its hook into a suitable position for replacing a broken thread when necessary.

Another set of levers, connected with the vibrating lever of the electro-magnet, move the "little toothed wheel" by means of a slide, click, and ratchet wheel, and thus bring the newly attached cocoon to the side of the pan occupied by the cocoons which are unwinding. For this purpose a suitable "carraige," with lever and spring mechanism, moves on the axle of the "little toothed "wheel." The "vertical swing" is then replaced by the last mentioned slide, the electric circuit is broken, and the winding goes on as before.

If the silken thread "formed of the whole of the assembled "cocoon threads" breaks, another large "swing," acting on a different part of the electric circuit to those already described, also mounted on the principle of unstable equilibrium, breaks the electric circuit that otherwise would be completed by the smaller "swings," "and prevents the machine from acting" "until the "spinner has reinstated the principal end thread, and set either "the winder or reel to work."

[Printed, 1*s.* 10*d.*]

A.D. 1855, July 24.—N° 1673.

WESTWOOD, Joseph, and BAILLIE, Robert.—"Improvements in preserving timber-built ships, also timber or wood and "wrought iron used in situations exposed to the action of water "or of weather."

Amongst other purposes, this invention may be applied to [*electric?*] "*telegraph poles, tensing posts, and other similar* "*purposes.*"

The invention "consists in applying to the wood or iron used "for such purposes a preparatory coating of black varnish, or "other composition having similar properties thereto, and afterwards a coating of asphalte or bituminous composition, whereby "the latter will be made to adhere with increased tenacity to the "surface to which it is applied."

[Printed, 3*d.*]

A.D. 1855, August 15.—N° 1848.

STATHAM, Samuel, and SMITH, Willoughby.—"Improvements in electric telegraph cables, or cores for the same," consisting of:—

1st. "The construction of electric telegraph cables, or cores for
" cables, by laying one or more wires spirally" [helically?]
" round a core of insulating material, with or without a wire
" therein, or of fibrous material covered with insulating material,
" prior to such wires receiving their final insulation." Successive alternate layers of wires and insulating material may be added to the core formed as above. The wires may be "flat, circular, or of
" any other desired shape," and "either single wires, or ribbons,
" or a cord composed of a bundle of wires, or of several wires
" plaited, woven, braided, or otherwise held together."

2nd. "An improved means of joining electric telegraph con-
" ductors." Instead of soldering one lapping of coiled wire to the ends of the two wires to be united, as at present practised, a second lapping is coiled round the first, and extended beyond it; this second lapping is only soldered at the two ends thereof that project beyond the first.

[Printed, 6*d*.]

A.D. 1855, August 30.—N° 1955.

MORE, James.—"Improvements in marine and surveying com-
" passes."

This invention "relates to the prevention of the deranging
" influence of local attraction upon the magnetic needles of
" marine and surveying compasses of various kinds."

The needle is coated entirely (excepting the point of suspension) with "shell-lac" or other gum resin; thus coated, it is imbedded in "cork or other suitable vegetable material," "of considerable
" thickness or depth, and this cork covering is then finally coated
" with shell-lac or gum resin, just as the needle itself was coated."

"The interior of the binnacle or compass case may also be thus
" treated or coated for preventing the deranging influence of
" local attraction."

The Drawings show a needle with a cork casing of rectangular section; the whole is poised upon a stile, and has an inverted conical cup, made larger than usual.

[Printed, 7*d*.]

A.D. 1855, August 30.—N° 1956.

GEDGE, John (*a communication from Jacques Joseph Hyppolite Mailly*).—(*Provisional Protection only.*) "Improvements in gal-
" vanising substances."

"The article to be galvanized" is first well pounced and cleaned with alcohol, then "those parts intended to be galvanized" are powdered well with plumbago, and brushed with a strong open brush. Where there is open work, a strip of plumbagoed new chamois leather is worked through the open work, so that the whole becomes perfectly black and shining.

The bath is made "in a vase of sandstone, or one of wood lined "with gutta percha;" this is filled "with three parts of water," and "several open-work baskets containing powdered sulphate of "copper" are placed therein, "allowing several days for its dis-"solution, and adding thereto until the bath shall have attained "20 or 25 degrees."

"In arranging the piles" a "porcelain tube" is taken, "and "a blade of zinc of the same size as the interior of the tube, but "longer," "above the zinc blade a narrow band of brass wire" is passed. The pile is then put "into the bath, introducing water "into the tube. To the object to be galvanized" are attached "seven or eight conducting wires," whose ends are twisted together "in form of a hook, which is hooked on to the brass "wire band, the band being soldered to the zinc blade. The pile "thus prepared, the objects are to be suspended in the bath, and "a few drops of sulphuric acid are then to be added to the water "in the tube; a slight ebullition will take place, continuing for a "short time. At the expiration of two or three hours the object "ought to be slightly covered, and should be allowed two or "three days to perfect the coating. When taken from the bath, "the objects should be well pounced, brushed, and cleansed before "being gilded or silvered."

[Printed, 3d.]

A.D. 1855, September 4.—N° 1997.

TAYLOR, John George.—(*Provisional Protection only.*) "Improvements in coating, covering, or plating metallic surfaces."

"This invention relates to the application and use of the metal "or metallic earth aluminum, otherwise aluminium, as a material "for coating, covering, or plating metallic bodies or surfaces. It "it is intended to apply the aluminium for this purpose either by "the action of electricity, magnetism, or galvanism, or by the old "system of plating with sheets. It is preferred, however, to "effect the application or deposition of the aluminium by means

" of electricity or electric agency, the aluminium being thus ap-
" plied either as a coating to base metals, or as a preservative film
" or covering to the precious metals. In addition to these appli-
" cations of aluminium as in ornamental coating, or as a preser-
" vative for ornamental surfaces, it may be applied for preserving
" ships' sheathing, as well as for protecting a great variety of
" other metallic surfaces which are liable to injury from the
" atmosphere, from gases, from liquids, or from direct chemical
" action."

[Printed, 3*d*.]

A.D. 1855, September 8.—N° 2039.

BALESTRINI, Pier Alberto.—(*Provisional Protection only.*)
" Improvements in insulating wires for electric telegraphs."

" This invention consists of first winding the wires with hemp
" or other fibres, on to which several coatings of a solution of
" india-rubber are applied, after which a coating of marine glue is
" added. The wire thus coated is then wound with one or
" several strands or yarns (laid around side by side) of hemp or
" other fibre; such winding being in the opposite direction to the
" previous winding, coatings of india-rubber solution and of
" marine glue are to be again applied. Each wire thus coated is
" then placed in a cord, yarn, or strand, which is coated thoroughly
" with india-rubber or other waterproof coating, and in this
" manner they may be laid down for use; but when several wires
" are to be used, and greater strength is required, then a metallic
" wire is wound around the bunch or bundle of the above insu-
" lated wires."

[Printed, 3*d*.]

A.D. 1855, September 8.—N° 2043.

GRENET, Eugène, junior.—" An improved electro-magnetic
" apparatus for motive power, part of which may be employed
" separately for the generation of electric currents."

An electro-magnetic engine is described and shown having the following peculiarities:—

The engine consists of plate electro-magnets "fixed on rings
" formed on two concentric cylinders, one moveable, the other
" fixed." The plates have their edges parallel to the shaft passing through the cylinder's centre; those attached to the outer or fixed

cylinder project radially inwards, and those fixed to the inner or revolving cylinder (which is attached to the shaft) project radially outwards. The rings or sets of electro-magnets do not act all at once, but have the electric fluid admitted to them one at a time in series, the revolving rings being set on the central shaft, so that their magnets arrive opposite those on the fixed rings in succession until the magnets of the first in series are again brought within range.

A "current changer and contact breaker" effects "the simul-"taneous magnetization of the fixed and revolving parts of "the apparatus by two different currents." The current changers for the fixed and revolving magnets are separate, and the battery current is divided into two currents for that purpose. "Forked" conductors from the battery press upon cylinders of insulated and metal portions placed alternately, and reverse the currents at each breakage of circuit; as, when the conductor is on the insulated portion of one cylinder, it is on the conducting portion of the other. The current is conveyed to the whole of one series or ring of electro-magnets at a time by one cylinder, and conducted back to the battery from the same series by the other cylinder.

The particular ring or set of magnets in action is determined by a "distributor" in conjunction with the current changer. The "distributor" consists of wires from each series of electro-magnets in connection with rings on the current changer; the wires make contact with the inlaid metal pieces on the cylinders at different times, thereby exciting the rings at the proper times and in succession.

To enable the electric current to be conveyed to the whole of a series simultaneously, each series has two copper rings, one connected to one coil terminal of each electro-magnet, the other connected to the other coil terminal. By this means the length of battery circuit is confined to the coil of one magnet of each series.

The battery used to the above-described engine consists of platinized corrugated copper plates and grooved zinc plates, excited by a mixture of sulphuric acid and sea-salt.

The battery may be filled at one operation, as the gutta percha cells are all contained in a lipped trough; any excess escapes by the lip to a trough beneath. To enable the battery to be emptied at one operation, the battery trough is mounted on

trunnions; on being inclined the exciting fluid is discharged into the trough beneath.

[Printed, 2s. 2d.]

A.D. 1855, September 8.—N° 2045.

ALLAN, THOMAS.—(*Provisional Protection only.*) "Certain "means of correcting or preventing the deviation of the compass "needle from local attraction."

For this purpose an ascertained induced magnetic influence is used "as a counterpoise equivalent to counterbalance at equal "angles from the true north the magnetism of the ship's iron or "force of deviation." To ascertain this, "the ascertained line of "the ship's magnetism" is placed "in a line, say N.E.;" a counterpoise (consisting of a bundle of soft iron rods) is then placed N.W. on a circle having the needle pivot for its centre. By adding to or taking from the bundle of iron rods, its magnetism is made exactly to counterbalance the magnetism of the ship's iron; the needle will in that case exactly bisect the angle "formed by the line of the keel N.E., and the radial line on "which the counterpoise is placed N.W. After this balance of "power is precisely ascertained, the true north can at any time "and in all latitudes and positions be found by shifting the "counterpoise forward or backward until the needle bisects the "angle formed by these two lines aforesaid."

In another plan the counterpoise is not required to be shifted "to ascertain the true north by the bisection of the angle of the "forces." The method consists of placing the counterpoise in continuation of the line of the ship's magnetism; in the instance above cited of the N.E. position of the line of the ship's magnetism, according to this plan, the counterpoise is placed "in a line "S.W.," and "it will, by its repulsion on the south pole of the "needle from the west, counterbalance the attraction on the "north pole of the needle from the east."

[Printed, 3d.]

A.D. 1855, September 11.—N° 2058.

KENNEDY, JOSEPH CAMP GRIFFITH (*a communication*).— "Improvements in the mode of and apparatus for transmitting

"signals by the use of the electric current, part of which im-
"provements is applicable to the regulating of machinery
"generally."

The general arrangement of the apparatus is as follows:— A barrel at the transmitting station and type wheel at the receiving station are rotated continuously and synchronously by clockwork; another clock train however, which actuates the printing mechanism, is only set free on the momentary completion of the electric circuit at the transmitting station. The barrel carries a series of projecting pins helically disposed upon its surface, by which means electric connection is made with the receiving station only at the instant that the type wheel is in a position to print the desired letter. On the completion of the circuit a horseshoe permanent magnet, usually in contact with the cores of a horseshoe electro-magnet, is released therefrom and permitted to be risen by a spring; thus giving motion to a detent lever which releases a cranked axle belonging to the printing clock-train. The said cranked axle brings the paper up to the revolving type wheel for an instant by means of a platen fixed to a connecting rod; the type wheel is thus made to print whilst in motion. By an arrangement of levers the cranked axle (before the completion of its revolution) brings the permanent magnet into contact with the electro-magnet's cores, to which it then adheres, thus only moving the platen once up to the type wheel for each depression of a key at the transmitting station.

The other peculiar features of this invention are as follows:—

The system of stops and levers that make contact with the helically disposed pins draw the desired contact lever into a notch in a notched bar, where it remains until struck, raised, and replaced by its pin.

"A return message can be transmitted between the intervals "that must necessarily elapse between the following signals of "the same operator." A single line wire is only used for this purpose. Two cog-wheels or circuit breakers (insulated from each other), one in connection with the electro-magnet, and the other connected to the barrel at the same station, are so arranged that the connection shall alternate at each station between the receiving and transmitting instruments, in such a manner that the connection is always simultaneously through the transmitting cylinder of one station and the electro-magnet of the other station.

The current is conveyed to the circuit breakers by the same spring, in connection with one of the battery poles.

Those stations that are not intended to receive the message are shut off from the circuit by a bolt, which is shot against a flange on the type wheel by the depression of certain stops, thereby acting like a brake. A projection on the cranked axle enters a notch in the bolt; at those stations where the signals are to be read, the bolt merely enters a notch or slot in the flange, and is so formed as to let the flange and type wheel revolve freely.

To adjust the speed of rotation of the transmitting and receiving instruments, the clockwork is regulated by an escape wheel and pallet; the tail of the pallet lever being connected by a rod to a vibrating spring. The vibrations of the spring are adjustable by means of a small weight which slides on it. This improvement is also applicable to regulating other machinery.

[Printed, 1*s*. 10*d*.]

A.D. 1855, September 15.—N° 2084.

SCULLY, Vincent, and HEYWOOD, Bennett Johns.—(*Provisional Protection only.*) "An improvement in the manu-"facture of certain articles which are subject to the corroding "action of the air and moisture."

Various applications of the metal "aluminium" are set forth.

It is further stated that as aluminum "is capable, when "burnished, of retaining a bright metallic lustre," it is proposed "to employ it in the manufacture of medals, coins, plated goods, "and articles of virtu, such articles being either stamped in dies, "or cast and chased, after the manner of the silversmith in pro-"ducing statuettes, or manufactured after the manner of *repoussé* "work, *or coated by the electro-deposition process.*"

[Printed, 3*d*.]

A.D. 1855, September 15.—N° 2089.

GORDON, Lewis Dunbar Brodie (*a communication from Werner Seimens* [*Siemens?*]).—"An improvement in electric "telegraphs when insulated wires are laid under water or in "the earth."

The object of this invention is to obviate the effects of the static

or residual charge in long lines of submarine and subterranean telegraphs.

The invention consists chiefly in using "a set of two insulated "wires placed in close proximity to each other, and imbedded in "the middle of one mass of gutta percha or other insulating "material as one electric circuit, in which the battery and receiv- "ing instrument are inserted, without using the earth as part of "the circuit."

The same cable may contain several sets of insulated wires "in "close proximity to each other, which may be used simulta- "neously as circuits without the interference of one with the "other." "In order to render the electric waves succeeding "each other still more separate and distinct," the battery current is reversed for an instant "before breaking the circuit."

A pair of conductors (for one circuit) may be placed in one cable, by using an insulated copper wire in the centre and surrounding it with iron or copper wires, the whole being covered with fibrous material, and then with gutta percha.

The wires may be insulated from each other by fibrous materials, and placed in the middle of one mass of gutta percha. This is an important feature in the invention.

[Printed, 3*d*.]

A.D. 1855, September 17.—N° 2103.

BRIGHT, Charles Tilston, and BRIGHT, Edward Brailsford.—"Improvements in electric telegraphs, and in ap- "paratus connected therewith."

This invention "consists of improvements in the electric tele- "graph complete," in which sound is employed as the communicating medium instead of visual indications. "A complete "electro-phonetic telegraphic instrument" and its necessary arrangements consist of the following parts:—

1st. The apparatus for and method of transmitting signals; this may also be applied to the telegraphs at present in use.

2nd. The receiving relay; which has the means of increasing its sensitiveness and of protection from the effects of return currents.

3rd. The "phonetic" or sounding apparatus; this "may be "either used separately as a complete instrument, or applied in "part to other telegraph instruments now in use."

These arrangements are described, in the Complete Specification, in the following order :—

The arrangement preferred to communicate phonetic signals consists of an axle bearing a magnet and a double arm; the magnet, when acted on by electro-magnetic coils, causes the axle to vibrate or deflect in one direction, thus sounding a bell by means of a hammer head on one arm; the subsequent reversal of the electric current causes a "muffler" on the other arm to stop the sound.

It is preferred to reverse the electric current by means of a "reversing connector" in conjunction with the relay. The "reversing connector" forms a part of the signal apparatus; it consists of "an iron or steel fork" free to vibrate between two fixed magnetic bars. On the excitation of the coils, a pin on the hammer axle deflects the fork according to the direction of deflection of the said axle.

The local circuit through the relay, the "reversing connector," and the signal instrument, is as follows:—One battery pole is connected to the right-hand stop of the relay and to the right-hand fixed magnet of the "reversing connector," the other battery pole is connected to the left-hand stop and to the left-hand fixed magnet. The vibrating arm of the relay is connected to one coil terminal of the signal apparatus, and the "fork" to the other coil terminal. The normal position of the "fork" and of the arm is to the left hand, connecting therefore one battery pole with both the coil terminals. When the relay arm is deflected, however, a local battery current traverses the coils, sounds the bell (by the deflection of the hammer axle), and deflects the fork against the right-hand fixed magnet, thus breaking its own circuit; when the relay arm returns to its normal position, the local battery circuit is again completed, but in a reversed direction, which stops the sound, and brings back the fork to its normal position, thus breaking the local circuit until the next signal is made.

The following methods of connecting the transmitting apparatus are described and shown :—

First.—Batteries at opposite ends of the line oppositely connected (so as to neutralize each other's effects), are short-circuited at the transmitting station when a signal is to be given; thus the battery at the receiving station can have full effect on the receiving instrument. In this method a galvanometer coil and needle is used either to indicate signs or to act as a relay. "Magnetic regulators,"

adjustable at various distances from the needles, increase the sensitiveness of the needles and protect them from the effects of return currents.

Second.—The same general arrangement as the first method, but " electro-magnetic coils and soft iron armatures with delicate " restraining springs are employed in place of deflecting coils."

Third.—A similar arrangement to the second method, in which, however, the electro-magnetic coils of the relays have armatures and stops at each end, thus enabling signals in opposite directions to be made simultaneously. One of the armatures has a weaker spring than the other; in the normal condition the weak-springed armature is in contact with the coil. When either of the batteries are separately short-circuited the strong-springed armature is attracted and the local circuit is completed by its flexible end; when both the batteries are short-circuited at the same time, the coil attracts neither armature, and the local circuit is completed by the weak-springed armature.

An apparatus for obtaining a nearly continuous current from currents induced in secondary coils by the action of a quantity galvanic battery on primary coils. A suitably inlaid axle is rotated against springs by means of clockwork; the springs convey the various electric currents to and from the inlaid metal pieces of the axle; the terminals of the secondary coils are thus changed exactly at the time that the battery current is reversed through the primary coils. This apparatus "may be generally used for telegraphic " purposes."

Temporary currents can be excited in induction coils by means of a finger key whose studs and springs are arranged on a similar principle to the above-described clockwork apparatus. "The " currents thereby induced in the secondary coils are passed along " the line without going through their own receiving coils." (See finger key described in N° 14,331, Old Law.)

To produce powerful effects from secondary coils, the following arrangements are set forth:—The primary coil may be wound upon an iron rod and surrounded by an iron tube, both being in connection with the iron flanges of the coil; the secondary coils in this case are exterior to the iron tube, and, if necessary may " be surrounded by another iron tube, and an additional serving " of the primary coil." To increase the quantitative effects, the primary coil may be surrounded by a number of iron rods, each wound with secondary wire.

In using very powerful secondary currents an arrangement is adopted to protect the receiving coils from the effects of the return current. A [magnetic?] "arm," connected with the line wire, is free to vibrate between two stops; one connected with the coil terminal of the receiving instrument, the other with that of a "supplementary" coil and with the sending instrument. The normal position of the "arm" is in contact with the terminal of the receiving coil. The "supplementary" coil is so connected with the sending and receiving apparatus (with the receiving apparatus through the earth circuit) that the "arm" is not deflected by the action of the coil, when the first current traverses the line wire; the return current, however, deflects the "arm" so that the "supplementary" coil is then in circuit and discharges the return current. This last discharge replaces the arm in its normal position. "Thus the receiving coils cannot be in connexion "with the line after any current has been sent, until the line has "discharged itself by passing through the supplementary coil."

Increasing the sensitiveness of the receiving apparatus. In one adaptation of the improvement "to double current alphabets, where "the indicator or arm of relay is deflected by one current, and "brought back to zero by another," the deflecting coils have hollow soft iron cores formed by "pins" "united laterally by "thin plates" "and at their outer ends by stouter iron plates," "whereby the pair of coils on each side are electro-magnetic as "well as deflective in their effects;" the pivoted needles or magnets (whether bar or horseshoe) are free to vibrate within the hollow soft iron cores. In an adaption of this improvement "to "double movement coils, with a means of obtaining a dead beat, "which is applicable to all methods of moving indicating mag-"nets, by the increased force of temporary polarity induced in "soft iron," a pair of deflective coils and an electro-magnet are employed. The axle of the deflecting magnets carries an arm with a pin, which is restrained in the centre by a cup fixed to the end of the lever-armature of the electro-magnet; when the coils and electro-magnet are excited, the cup is withdrawn from the pin and the magnets allowed to deflect; on the current ceasing, the armature is influenced by a reaction spring, and the cup reinstated in its place so as to bring the indicator to zero by acting on the pin.

[Printed, 1s.]

A.D. 1855, September 28.—N° 2161.

GRAY, WILLIAM DAVY.—"An apparatus or instrument for "showing the course or direction and distance run by a ship "at sea."

This invention consists "of a fan revolving in the water, which "gives motion to a cylinder so constructed as to cause shot to "fall in a tube placed on a magnetic needle in proportion to the "velocity of the vessel. The tube conveys the shot to a number "of cells; the shot again pass into a number of tubes suspended "from a disk, which disk is supported on a pivot or by gimbols. "On the disk is placed a bale" [ball?] "to show the direction "or inclination. The pivot or gimbols act on a balance having "an indicator to show the weight of the shot, which gives the "distance run by the ship, and the inclination of the said disc "gives the course or direction."

"The fan also acts in the water as a vane, to obtain the correct "direction of the ship when she is making leeway;" horizontal motion is thus communicated to the cells, by means of a lever, cord, and pulley. "By this arrangement, the cell which is in a line "with the ship's true course is brought opposite to the magnetic "needle, instead of the cell which represents the head of the ship."

"When the apparatus is only used as a tell-tale to show the "course in which the ship is sailing," the fan is dispensed with, motion being given to the shot-supplying cylinder by clockwork, "and the true distance may then be obtained with Massey's "patent log by proportion."

[Printed, 6*d*.]

A.D. 1855, October 12.—N° 2280.

PULS, FRANCIS.—(*Provisional Protection only.*) "Improvements "in electro-coating metals or alloys of metals with other metals "or alloys of metals."

This invention is carried into effect as follows:—

"Galvanic batteries of any suitable description" are constructed, "in which the positive plates consist of the metals or alloys of "metals with which the articles are to be coated."

The exciting fluids employed consist of "such acids or mixtures "of acids in a diluted state as may be found suitable in each "instance to the metals operated on, as, for example diluted "sulphuric, nitric, or hydrochloric acids, or a mixture of the same."

" 'The batteries thus formed and furnished with exciting fluid" are placed "in a suitable trough, in conjunction with the articles " to be coated, and so adjusted that the solution of the metals or " alloys of metals obtained from the positive plates of the battery " can freely pass to the articles to be coated therewith, and thereon " deposit the said substances through the agency of the electric " current created by the same batteries."

[Printed, 3*d*.]

A.D. 1855, October 18.—N° 2336.

STATHAM, Samuel.—"Improvements in electric telegraph " cables."

This invention "consists in producing a telegraph cable, light, " flexible, and strong, applicable for submarine as well as for " subterranean purposes, in the following manner:"—"A core, of " gutta percha or other insulating material," is taken, "con- " taining therein one or more metallic wires, strips, or plates, " used for conducting the electric fluid;" "round or over such " core," is placed "strands of hemp or cord, or a tube of any " suitable fibrous material, or metallic wires or strands covered " with fibrous material, or both wires or strands and fibrous mate- " rial, or with wire or strands of wire, fibrous material and wire, or " strands covered with fibrous material;" "either or all of these " substances being coated with some protecting material, such as " marine glue, or employed without being coated." The core ("covered by one or other or all of the materials just named") is encased "in an outer casing or tube of gutta percha, or any of " its known compounds, or either of these combined with " metallic or other substances."

The weight of this cable may be regulated by the employment of metallic or fibrous materials between the insulated wire and the outer coating, or by the employment of gutta percha or its compounds alone or combined with some suitable substance heavier than itself.

In the Provisional Specification it is mentioned that the conducting wires may be placed between a core and outer casing of gutta percha. Around the core, metal wire, &c., is wound "at " right angles or nearly so."

[Printed, 3*d*.]

A.D. 1855, October 25.—N° 2391.

RICHARDS, John Andrew.—"Improvements in producing "the 'hard grain' on leather."

"This invention consists in producing the hard grain on "leather, by passing it, when in a state to receive the hard grain, "under a roller made in the following manner:—A skin of "leather which has been hard-grained in the ordinary manner "is electrotyped," "and the plate thus obtained is bent round "and mounted on an axis, or, if it is preferred, the roller for "graining the leather may be cast from the electrotype plate."

The manner of performing the invention is as follows:—The already hard-grained leather "is held in an even and extended "state; the hardened surface thereof is then made conductive of "electricity by plumbago, and a deposited plate, by preference "of copper, is then obtained by the electrotype process."

"In place of obtaining the deposited metal coating on the "leather, a cast may be taken in plaster of paris or other suitable "material from the leather, and then a reverse by a second cast "of such material, which latter cast, being rendered conductive "of electricity, may be used to obtain the desired result. The "roller thus produced is used with a second or plain roller, and "the leather is hard-grained by passing the leather between the "pair of pressing rollers, which are mounted in suitable bearings "in like manner to those in which embossing rollers are "mounted."

[Printed, 3*d*.]

A.D. 1855, October 27.—N° 2396.

KLEINSORGEN, Joseph Charles Frederic, Baron de.—"An improved variation and azimuth compass."

A compass is described and shown, having a case composed of two glass cylinders, united by a brass partition. The ordinary needle card is mounted at the lower part of the lower cylinder (the Drawing shows it by a line at the bottom of the upper cylinder). "At the bottom of the upper cylinder is secured a brass plate, on 'which is fixed an immovable compass card;" a thin blade is fixed with its edge vertical over this card, and gives by its shadow at noon the true north point. It would appear from the Speci-

fication that the shadow of the south pole of this blade is used. An arrow engraved on the lower glass cylinder serves as a means of comparing the moveable card with the fixed card.

The cover of the compass case is fitted with a lens "which con-"centrates the light on the card" "of the upper cylinder when "the sun is obscured by clouds."

This apparatus may be "employed in hydrographic and topo-"graphic surveys."

[Printed, 7*d*.]

A.D. 1855, November 2.—N° 2447.

BAGGS, ISHAM, and OSMAN, HENRY FORFAR.—"Improve-"ments in steam engines, and in engines generally which are "worked either by gas, air, or vapour, and in apparatus for "generating electricity for effecting parts of said improvements, "and for other purposes," consisting of:—

1st. A method of working steam engines more or less expansively, "by having at the ends of the slide valve additional sliding "pieces, which are moved at proper intervals, and are of such a "size as to cover the ports when necessary."

2nd. "Applying the power of magnetism to counteract the "pressure, and so to diminish the friction of slide valves." A permanent magnet or electro-magnet is attached to the top of the valve, and acts upon a soft iron bar "properly supported in the "valve box, so that its under surface shall be very nearly or just "in contact with the poles." "The cover of the valve box "encloses the whole arrangement."

The strength of the magnet is made such as to very nearly counteract the pressure of the steam.

"When sliding end pieces are employed" (as described under the 1st head), they must each carry a magnet.

Other applications of this improvement are mentioned.

3rd. Improvements in galvanic batteries. The combined plates are cased under the liquid, the lower part of the case being open to the liquid in the external trough. "The action is as follows:— "As soon as the current is established the generated gas renders "the liquid within the case specifically lighter than that which is "without, and a rapid circulation ensues in consequence."

[Printed, 7*d*.]

A.D. 1855, November 2.—N° 2455.

JONES, JOHN.—(*Provisional Protection only.*) "Improvements "in electric telegraphs."

"Characters which are formed at one station" are "reproduced "at another distant station by the agency of electricity."

"The transmitting instrument consists of two frames or boxes" at right angles to each other, "each of which encloses a set of cog "wheels with a communicating apparatus." A pencil-lever, holding a pencil, is connected by rods and universal joints to each of the cog-wheel axes in such a manner, that (acting in conjunction with their respective commutators) the axes "indicate the move- "ments of the pencil fixed to the lever by transmitting and "breaking currents of electricity."

In the recording instrument the transmission and breakage of the currents cause a fac-simile of the motions of the pencil of the transmitting instrument to be made by the pencil attached to it. For this purpose two frames containing machinery are placed at right angles to one another; the machinery acting, by means of electro-magnets and escapements, on arms and a pencil. Two line wires are required for this arrangement, one for each frame.

A third apparatus may be used in conjunction with a special battery and third line wire, "to elevate and liberate the pencil "fixed in the receiving instrument, so as to prevent unnecessary "marks being made on the paper." When the pencil of the transmitting instrument is raised from the paper, a magnet at the receiving station withdraws the recording pencil by means of a lever-armature and cord. When the special circuit is broken, a spring presses the recording pencil on the paper again.

[Printed, 4*d.*]

A.D. 1855, November 10.—N° 2528.

PIGGOTT, WILLIAM PETER.—(*Provisional Protection only.*) "Improvements in galvanic, electric, and electro-magnetic appa- "ratus, and in the mode of applying the same as a curative and "remedial agent," consisting of:—

1st. A brush for causing "positive or negative currents of electricity" to be conveyed to the skin. Bristles are used, in combination with metallic wires or plates; these receive "their "electricity, galvanism, or electro-magnetism," from apparatus

fixed in the back of the brush or otherwise. Electro-coated bristles alone may be used.

2nd. A bath to administer "galvanism, electricity, or electro-"magnetism, one part of which bath will communicate positive "and the other negative electricity." This is effected by forming "the bath of a combination of elastic or flexible waterproof "material and metal in such way that when a part of the water-"proofing material is caused to envelope any required part of the "body, two distinct currents of electricity, galvanism, or electro-"magnetism, are created in the same bath."

[Printed, 8*d.*]

A.D. 1855, November 10.—N° 2532.

NEWTON, ALFRED VINCENT (*a communication from Giovanni Caselli*).—"Improvements in transmitting fac-simile copies "of writings and drawings by means of electric currents."

The object of this invention is to convey, with great rapidity, fac-similies of hand-writing and drawing by electric telegraph, a single line wire being used.

Instead of employing "watch-work to" obtain perfect synchronism of motion in the transmitting and receiving machines, a pendulum, driven by electro-magnetism, is used. The motive power to revolve the receiving and transmitting cylinders is a weight acting on clockwork; its rotation is intermittent, and is regulated by the motion of the above-mentioned pendulum.

The pendulum bears at its free extremity an electro-magnet which is excited by means of a local battery whenever it is within the range of attraction of one of two soft iron armatures; one of these armatures being fixed at each extremity of the arc of oscillation. When the electro-magnet nearly comes into contact with one of the armatures, the line-wire current (if its circuit is already completed as far as the instruments at other stations are concerned) is established through a relay by means of the pendulum rod, the local battery circuit broken, and the pendulum's electro-magnet demagnetized. As it is necessary for all the pendulums in the line-wire circuit to have completed their arcs of oscillation before the electro-magnet is thus demagnetized, the movements of the pendulums and of the apparatus regulated by them are rendered perfectly synchronous,

Attached to the pendulum by a jointed rod is a "carriage" which supports a fine steel point that can rub on the transmitting or receiving cylinder. Each time the carriage arrives at the end of its traverse a secondary electric circuit from the local battery is completed round an electro-magnet, by which means a pallet armature rotates the cylinder a certain distance by liberating one tooth of the escape-wheel belonging to the clockwork; the clockwork is thus moved a certain portion each oscillation of the pendulum. On the transmitting cylinder is placed metallized paper, the message being written in non-conducting ink; on the receiving cylinder is placed paper, chemically prepared with a solution of "crystalised nitrate of ammonia" and the double cyanide of potassium and iron. Parallel lines in Prussian blue at a certain small distance apart are thus made on the receiving cylinder, except when the style or point of the transmitting apparatus passes over a non-conducting portion of the metallized paper. Thus a fac-simile of the message at the transmitting station is produced on the prepared paper at the receiving station, the writing being in white upon a blue ground.

If the fac-simile of the message be required in blue upon a white ground, a portion of the line-wire battery is connected to the receiving cylinder at the same station, thus forming a local circuit. When the line-wire circuit is closed this local circuit is neutralized by a portion of the line-wire current, which traverses the same wire in the opposite direction. In order to enable these currents to perfectly neutralize each other, a "reostat" [rheostat?] is used. When, however, the line-wire circuit is interrupted by the non-conducting ink at the transmitting station, the local current at the receiving station takes full effect on the prepared paper, and (when the style has traversed over the whole of the message) renders the fac-simile in Prussian blue.

The above-described apparatus (called "the pantographic "telegraph,") is constructed so as to receive and transmit at the same time. The clockwork at each station rotates two cylinders, as above set forth. The traversing carriage has two tracing points, one working on each cylinder; during one direction of the pendulum's oscillation, thence of the motion of the carriage, one tracing point rubs over the transmitting cylinder (the other being upheld by the action of suitable levers and pins), and during the other direction of the pendulum's oscillation the other tracing

point rubs over the receiving cylinder (the transmitting point being then upheld). The connections of the line-wire circuit between two stations are so made and the tracing points are so arranged, that the same direction of oscillation of the pendulums is made at one station to put the receiving point into action, and at the other the transmitting point. The effect of this arrangement is that each station can be receiving and transmitting messages at the same time.

To augment the rapidity of the transmission of the despatches it is only necessary to have the pendulums of a greater length, thus giving a greater length of cylinder for the transmission and reception of messages. By the use of stenographic writing the speed of transmission may be still further increased.

An "autographic telegraph," patented by "Mr. Bakwell" in "1843," is alluded to in the Complete Specification [See N° 12,352, Old Law?].

In the Provisional Specification it is stated that the tracing point (worked by a screw motion) is attached to the pendulum, and that it moves over a fixed metal frame, on which the paper is strained.

[Printed, 11*d*.]

A.D. 1855, November 14.—N° 2571.

NEWTON, ALFRED VINCENT (*a communication*).—" An im" proved manufacture of electrotype printing surfaces."

" The chief object of this invention is to facilitate the backing " of electrotype shells or casts " " to be used for printing." "The " mould or article to be duplicated by the electrotype process is " placed in a common printers' chase and surrounded by rules, in " order that the counterpart of their upper edges may form a flat " margin on the electrotype shell. When the article to be dupli" cated by electrotyping is thus locked up in the chase, a coating " of copper is thrown down upon it in the usual way by a galvanic " battery, and the shell thus formed is removed from the copper " solution and washed and tinned on the back."

" It is then placed face downwards upon a bed plate and a " mould frame is set over it, so as to bear upon the margin of the " shell; a cap plate is then fitted on, and by means of clamps " the whole are tightly secured together. The mould is then

"heated, and molten type metal is next poured therein. On "cooling, an adhesion between the copper shell and the type metal "will be found to have taken place."

[Printed, 6d.]

A.D. 1855, November 15.—N° 2575.

DUNCKER, Franz (*a communication from Mr. A. Bernstein*).—"A new instrument for electric telegraphs, called 'Dispatch dis-"'tributor,' which will permit despatches of various contents being "communicated at the same time to one or more stations by means "of one or two line wires only."

The general features of the "dispatch distributor" set forth in the Provisional Specification are as follows:—There are as many batteries as despatches to be sent simultaneously; these act on "anchors" or keepers (respectively pivoted in front of one of the poles of an electro-magnet) thereby completing the requisite circuits; the soft iron core of the electro-magnet is included in the said circuits. The batteries used are of different powers, and the resistance of the reaction springs of the keepers is respectively suited to the powers of the batteries; so that the action of the weakest battery only attracts one keeper, that of the next weakest battery attracts two keepers, and so on. When the batteries are used conjointly other keepers are attracted and circuits completed. In the case of simultaneous despatches, when one battery acts alone, its current is sent direct to its station, and when more than one act together, the keeper corresponding to their united action completes the circuit and fills up the break that would otherwise occur. When more than one keeper is attracted, the circuit of that with the strongest reaction spring only takes effect; as the keepers carry non-conducting "wings" that prevent the completion of the circuits that would otherwise be completed by the weaker springs. "If the destinations of the several messages are distant "from each other," distributors are placed at all the stations except the last; these distribute or send forward those currents whose messages are to proceed beyond the station at which the distributor is. The electro-magnet of the distributor has one of its poles turned so as to face the side of the other pole; by this means the action of the residual magnetism upon the keepers is adjusted so as to be "in an inverse ratio to the strength of their several "springs."

In the Complete Specification a "despatch distributor" is set forth the same as that described above in general principle of action, but with the following noticeable points.

The finger keys (one to each battery) each consist of a non-conducting lever with springs and studs suitably connected, so that when connection with the earth circuit is simultaneously broken by a number of keys the currents from the batteries belonging to those keys unite, but not otherwise. A spring finger plate completes a short circuit with the battery, before the current is sent along the line wire by the raising of the tail of the lever.

The distributing instrument set forth is the same as that already described in principle, except that certain electric connections between the keeper rods conduct all the currents that are not required to print by another way of less resistance. Instead of one electro-magnet, several electro-magnets (in consecutive circuit and with their cores in metallic connection) are used.

Another arrangement of batteries, finger keys, and relays (instead of the electro-magnets and "anchors" in the herein before described "distributing apparatus," but dependent upon the same general principles) is used in connection with "assisting batteries" when it is desired to make simultaneous communication of two despatches in either direction, between two stations. The "as-"sisting batteries" send assisting currents through external coils of the relays; neither these alone nor line-wire currents alone are able to affect the keepers, but when their force is united with that of the line-wire current the attraction is effected; a third relay does not act until both the keys of one station are depressed. When working in opposite directions, although the assisting batteries become disconnected by this means, the force of the line-wire current will be doubled (because contrary battery connections are made with the line wire at each end thereof) and the relays of both stations will be called into action.

Morse's printing instrument is supposed to be used in connection with the above-described apparatus, but the Provisional Specification states that the said apparatus is equally applicable to "the needle telegraph."

[Printed, 1*s*. 8*d*.]

A.D. 1855, November 19.—N° 2608.

PREECE, William Henry.—(*Provisional Protection only.*)

"Improvements in electric telegraphs."

"This invention consists in an improved manner of arranging "electric telegraphs to communicate in both directions at the same "time on the same wire." Instead of, as usual, introducing resistance coils to adjust the force of the local current "used to neutralize the influence of the outgoing line current on the receiving instrument," "the force of the local current is not adjusted, "but in place thereof its influence is increased or diminished as "required by altering its distance from the needle or other instrument on which it is arranged to act."

In the arrangements set forth two instruments are used (whether needles and coils or needles and electro-magnets) the line current exciting one and the local current the other instrument; the coils or electro-magnets are adjustable at various distances from the needle or needles. One battery current may pass through both coils, in that case an earth connection is made between the two coils; "then, by adjusting the distance of the coils from the "needles, a complete compensation is effected in the case of outgoing signals, and the instrument is free to be acted on by incoming currents."

A "pecker" may be placed on the needle axis, the force to move which is adjusted by a hand on the same axis.

In a chemical marking telegraph, the line current passes through the paper at both the terminal stations; but at the sending station a local circuit is completed at the same time as the line circuit, which passes an opposite compensating current through the paper.

[Printed, 3*d*.]

A.D. 1855, November 20.—N° 2613.

PULS, Francis.—"A new electric light and heat."

This invention consists of collecting and employing the gas or gases generated in galvanic batteries and "emanating direct" from them, "for heating and illuminating purposes."

A lamp upon this principle is described and shown, in which the body contains the exciting fluid. The stem of the lamp is enlarged at the lower portion so as to contain the battery plates, which are thus hermetically enclosed, except the tube leading to the burner and the open bottom of the battery trough which the prolongation of the stem forms. The prolongation and enlargement of the stem is within the body of the lamp, and thus allows the exciting fluid to act upon the battery plates.

In one instance the battery circuit is closed, and the resulting gas is made to pass through naptha or other carbonizing materials, on its way to the burner.

In a second instance the battery circuit is completed through a platinum wire in the gas flame, thus adding to the heat.

The apparatus need not, however, be arranged in the form of a lamp, the gas generating and carbonizing apparatus may be distinct and separate. It may also be conveyed in pipes to any distance, from a gas holder.

The battery may be employed for any required purpose when generating gas for the lamp.

[Printed, 5*d*.]

A.D. 1855, November 20.—N° 2617.

WHITEHOUSE, Edward Orange Wildman.—" Improve-" ments in electro-telegraphic apparatus, parts of which are also " applicable to other purposes," consisting of:—

1st. " Improvements in the construction of induction coils."

The secondary coil is placed nearest the iron core, and is surrounded by the primary coil; these coils may either be used singly, or two or more in combination, all of them being included in the same primary circuit. When the secondary wire is of considerable size, supplemental wires of smaller diameters are wound together with it; these supplemental wires occupy the interstices between the turns of the larger wire and " augment the quantitative energy " of the secondary current." The secondary current is obtained by reversing the direction of the primary current, or otherwise " reversing the polarity of the iron of the coils."

The secondary currents thus obtained are applicable to " electro-" telegraphic " purposes (See N° 1225, 1854), " blasting, ordnance " purposes, as well as for electro-chemical decomposition."

2nd. Improvements in relays.

In one arrangement, four upright " permanent magnetic pillars " surround the line-wire coil; within the coil is an upright bar or core of soft iron, free to vibrate on its vertical axis, which carries a soft iron horizontal cross piece. The polarity, induced in the cross piece by the coil, determines the direction of its deflection towards the poles of the permanent magnets and the circuit actuated.

In another arrangement, the required contacts are given by the deflection of a lozenge-formed piece of soft iron "mounted on "pivots" and "placed axially in the magnetic field between the "poles of a permanent horse-shoe magnet;" the poles of an electro-magnet embrace the soft iron piece at right angles to the poles of the above-mentioned permanent magnet.

In a third arrangement, an "armature at the end of a lever is "attracted by an electro-magnet, as is the case in the instrument "known as the 'Morse relay;'" in the Patentee's relay, however, the residual magnetism retains the armature, until the next current (by changing the electro-magnet's polarity) "releases for a mo-"ment the armature, which is immediately afterwards again at-"tracted." Contact is given during the momentary release of the armature.

To give a more perfect and delicate adjustment to the above-described relays than springs can afford, a permanent horseshoe magnet is mounted on its axis on a set screw, and embraces between its poles (without touching) a magnetized piece of steel on the moving part.

3rd. "Combining a dead beat magnetic needle instrument with "a relay fitted to receive alternating currents. The relay by call-"ing into play a local battery excites alternately the opposite "limbs of an electro-magnet, and thus produces movements in "the needle corresponding to the currents received."

4th. "The adaptation to an ordinary step by step dial instru-"ment" of a peculiar releasing or retrograde movement.

The pointer or hand is mounted loose upon its axis; it is however connected with the axis by a clutch-box arrangement during its forward progress. When the signal is indicated the clutch box is put out of gear and the hand turned to zero in the reverse direction. An attendant at the receiving station may either actuate an electro-magnet for this purpose, or the releasing action may be "made to act automatically" (See N° 1225, 1854). During the forward progress of the hand, the two parts of the axis are held together by the action of a "holding" magnet; but when the hand has arrived at the desired signal the current from a local battery is diverted from the "holding" magnet to another magnet, which takes the clutch box out of gear, called the "releasing mag-"net." The magnetism of the shorter parts of the poles of the latter magnet "acts upon a small piece of iron affixed to a toothed seg-

" ment, which gears into a pinion on the moveable parts of the " axis, and by causing such piece of iron to move into an axial " position between the poles, thereby (through the segment and " pinion) returns the hand to its starting point."

It is also proposed "to effect the escape of each tooth by the " action of a relay, which, calling into play a local battery, excites " alternately the opposite limbs of an electro-magnet, and produces " corresponding movements in a magnetic lever, on which the " teeth successively rest, and from which they are allowed to " escape in the usual manner."

[Printed, 11*d.*]

A.D. 1855, November 26.—N° 2662.

DERING, George Edward.—" Improvements in galvanic " batteries," consisting of:—

1st. " A new exciting liquid for the negative element of those " kinds of batteries in which nitric acid" has usually been employed for that purpose. This liquid consists of a mixture of hydrochloric acid with crystals of "nitrate of soda, or nitrate of " potash, or other suitable nitrates."

2nd, "Applying a granular coating of platinum, or other " suitable metals negative to copper, to the surface of copper, and " its alloys, for the purpose of improving their qualities as a " negative element in batteries." For this purpose an exceedingly " minute" amount of deposit is preferred to be applied by immersing the cleaned plate in a "weak acidulated solution of the " bichloride" of platinum.

3rd. " The turning over towards the inside the upper edge of " the containing vessels of galvanic batteries, and the employment " of floats of gutta percha or other suitable material upon the " surface of the liquids of galvanic batteries, for the purpose of " preventing the spilling of the same."

Useful for motive-power batteries on ships and vessels.

[Printed, 3*d.*]

A.D. 1855, November 27.—N° 2666.

ALLAN, Thomas.—" Improvements in applying electricity."

This invention " consists in the application of electricity by " the employment of a relay and two separate circuits, to produce " signals to the eye and ear simultaneously."

One particular application of the invention "is, communicating "between guard and engine-driver upon a railway train." The following apparatus are used for this purpose:—"On the engine, "a relay, local battery, gong or bell, and indicator;" a "line of "communication through the train to the guard's van (the circuit "being completed by the earth);" and in the guard's van "a "contact maker to put the relay on the engine into action." The relay—formed of a many-poled magnet (See N° 14,190, Old Law)—sets in action the bell and indicator.

Another method of conveying signals by means of a relay, is for the guard to signalize the common railway signals, white, green, and red, by means of a needle apparatus on the engine, actuated by the long circuit, the relay at the same time ringing a bell.

The above-described arrangements and combinations may be used "for all signalling purposes in general."

The Patentee's constant battery (See N° 339, 1853) may be used in this invention.

If the line of communication is effected "by one line run out "along the foot boards or otherwise, in order to provide against "breakage and disruption," a "conductor, made of a strand of "wires of mixed metals" (See N° 1889, 1853) is preferred to be used.

[Printed, 3d.]

A.D. 1855, December 3.—N° 2721.

WATT, Alexander.—"An improvement in coating iron and "steel with zinc."

This invention relates to the method of preparing a solution of zinc for electro-zincing iron and steel.

A strong solution of cyanide of potassium is placed in a porous vessel. In an outer vessel (containing the porous vessel) a solution of cyanide of potassium, to which liquid ammonia has been added, is placed. The outer solution is then charged with zinc by galvanic agency; a copper or iron negative pole is for this purpose placed in the porous vessel, and a zinc positive pole in the outer vessel. The solution in the outer vessel is ready for use on the addition of a certain proportion of "carbonate of potassa."

[Printed, 4d.]

A.D. 1855, December 6.—N° 2756.

THOMAS, FREDERICK SAMSON, and TILLEY, WILLIAM EVANS.—"Improvements in producing aluminium" [aluminum?] "and its alloys, and in plating or coating metals with aluminium "and alloys composed of aluminium and other metals."

This invention consists in electro-depositing aluminum from solutions of alumina, with or without other metals, and in electro-coating metals with aluminum and alloys of aluminum.

The following methods of preparing the various electro-depositing solutions are set forth :—

"No. 1. Solution of alumina."—Calcined alum is boiled with cyanide of potassium solution.

"No. 2. Solution of alumina."—"The oxide" of aluminum is precipitated from an aqueous solution of alum by "salts of tartar." After filtering and washing, the precipitate is dissolved by boiling in cyanide of potassium solution.

"No. 3. Solution of alumina."—The same as No. 2, except that "ammonia is used to precipitate the alumina in place of salts of "tartar."

"No. 4. Solution of alumina."—Calcined alumina, cyanide of potassium, and carbonate of soda are fused together, and the resulting mixture is boiled in water and filtered. The calcined alumina is produced by precipitation from an aqueous solution of alum by "carbonate of potassium," the alumina is then filtered and dried by roasting.

No. 5. Solution of aluminum and silver.—No. 3 solution is preferred to be charged with silver by electric means, using a positive pole of silver.

Solution of aluminum, silver, and copper.—No. 3 solution is preferred to be electro-charged with copper and silver by a positive pole of the two metals, alloyed in the proportions required to be used.

No. 6. Solution of aluminum and tin.—No. 4 solution is preferred to be electro-charged with tin by a positive pole of tin.

A second mode.—"The oxide" of tin (precipitated from a solution of tin in nitro-muriatic acid by "salts of tartar" and dried) is added to the fused ingredients specified in No. 4, and fused with them; the resulting mass is boiled with water and filtered.

A third mode.—The ingredients (alumina, cyanide of potassium, carbonate of soda, and oxide of tin) are fused together, and the resulting mass boiled in water and filtered.

No. 7. Solution of aluminum and nickel.—No. 3 solution is preferred to be electro-charged with nickel by a positive pole of nickel.

A second method.—A bag containing "oxide of nickel" is placed in the bath of alumina. The "oxide of nickel" is precipitated from a solution of nickel in nitro-muriatic acid by ferro-cyanide of potassium.

A third mode.—"The oxide" is precipitated from a solution of nickel in nitric acid by "carbonate of potassium." The precipitate is mixed with carbonate of ammonium, "oxide of alumina," ("prepared according to No. 3,") and water; the whole is then boiled and filtered.

No. 8. Solution of aluminum and copper.—"Alumina" is precipitated from an aqueous solution of alum, either by "carbonate "of potassium" or carbonate of ammonium, filtered, and dried by roasting. The dried alumina, cyanide of potassium, carbonate of soda, and "sulphurate" [sulphate?] of copper are melted together, and the resulting mass dissolved in water by boiling.

No. 9. Solution of aluminum, copper, and zinc.—Sulphate of zinc is fused with the ingredients mentioned in No. 8, and a solution of the resulting mass made by boiling in water.

No. 10. Solution of aluminum, silver, and tin.—"The oxides" of silver and tin are melted with the fused mass described in No. 4; the resulting compound is then dissolved in water by boiling, and filtered. "The oxides" of silver and tin are respectively precipitated by "salts of tartar," and more cyanide of potassium is used than in No. 4.

No. 11. Solution of aluminum and iron.—"The oxide" of iron is boiled in a solution of alumina ("prepared as before named") and the whole filtered. "The oxide" of iron is precipitated from a solution of the sulphate by "salts of tartar."

In depositing from most of the above-described solutions, either a positive pole of platinum (in conjunction with a bag of the oxides of the metals), or of the alloy to be deposited may be used.

If aluminum or its alloys be required in a solid state, it or they may be deposited on a metal which melts either at a higher or lower temperature than aluminum or the alloy, "or upon a metal "that is harder than the deposit, and the deposit can then be

"separated by heat or by scraping, and the aluminum or alu-
"minum and its alloys so obtained can be consolidated by
"processes already known."

In the Provisional Specification Nos. 2, 4, 9, and 10 are not mentioned; and the Complete Specification contains modifications of, and additions to, the processes described in the Provisional Specification; these occur in Nos. 5, 6, 7, and 8.

Letters Patent, N° 2724 (1854), granted to the Patentees, are referred to.

[Printed, 5*d.*]

A.D. 1855, December 11.—N° 2794.

TOLHAUSEN, Alexandre (*a communication from John Prime*).—"Certain improvements in mariners' and land compasses," consisting of:—

1st. "Making the glass of the compass with a rim to fit over "the top or head of the bowl, and providing a ring of any elastic "or suitable yielding material between the said rim and the head, "whereby rain or other moisture settling on the glass is prevented "from running into the bowl, and at the same time the glass is "protected against the expansion of the case."

2nd. "Balancing the compass card and needle by attaching "thereto a suitable number of rigid arms," "provided with "weights which screw or slide thereon to move them nearer to or "farther from the centre of suspension." By this means "the "dip of the needle" may "at any time be accurately compen-"sated for." This improvement is applicable only to the mariner's compass.

[Printed, 5*d.*]

A.D. 1855, December 13.—N° 2814.

HART, David.—"Improvements in signalling or communicating "between parts of a railway train, and in the instruments and "apparatus employed for such purpose."

This invention "relates to the use of electro-magnetism" for conveying audible and visible signals to the engine-driver of a train, and consists of:—

1st. The application of certain well-known apparatus in a novel manner to a signalling apparatus "which is the subject of

" a Patent granted to Alexander Symons " (See N° 11,751, Old Law, *Appendix*).

2nd. Certain improvements by which the striking of the alarum is prevented from affecting the dial instrument.

The general arrangement of the apparatus is as follows:— In the guard's van at the rear of the train there is placed a "wheel " circuit maker and breaker," and a reel carrying sufficient insulated wire for extending along the longest train; the circuit maker has contact with the reel and with the earth, thus using the earth as the return circuit. On the engine there is a small sand battery, a relay, a larger battery, and a "bell and dial instrument." The relay and small battery are used in connection with the long circuit to call into action the larger battery, which then actuates the alarm and signal apparatus. By an inverse arrangement of contact points, the relay may either be made to complete the local circuit by the completion of the long circuit or by the breakage of the long circuit; the latter arrangement is preferred, as in that case a weak but continuous current traverses the whole length of the train, and "the breaking away of any part of the train or such " other accident will be self recording." The two batteries and the relay may be placed in the guard's van next to the engine, if the oscillation of the engine influences the relay prejudicially and spills the fluids of the larger battery; suitable connections for the local circuit are, in this case, made between the van and the engine, and the only electrical instrument on the engine is the " bell and dial signal instrument."

" The wheel circuit maker and breaker" consists of a metal wheel with radial arms to turn it on its vertical axis. The upper side of the wheel is engraved to correspond with the dial plate on the engine. Contact is made and broken by means of a small metal wheel on the axis of the instrument, against which a fixed spring in the circuit bears; the metal wheel is suitably inlaid with non-conducting portions.

The reel has "a continuous contact piece or strap," "somewhat " like the strap of the eccentrics of a steam engine," thus enabling the wire to be unwound or wound up without interrupting the circuit. A "bracelet-like fastening" is shown, for attaching the extremity of the insulated wire to the small battery on the engine, or for attaching the lengths of wire in the case in which each carriage has its own length instead of employing the reel.

The relay consists of a horseshoe electro-magnet and spring lever armature, the prolongation of which lever armature completes the local circuit by deflecting against suitable stops.

The bell and dial instruments are mounted upon the same sole plate. The bell instrument consists of an electro-magnet and keeper; to the keeper is attached an adjustable "make and " break motion" that actuates the bell hammer whenever the local circuit is completed. The dial instrument consists of a step-by-step arrangement in which the pointer is driven by the action of the tail of a lever armature upon a pinion containing as many leaves or teeth as there are signals engraved upon the dial; the pinion is fixed on the pointer axis and is prevented from over-running by a roller at the end of a lever which drops between the teeth after each action of the lever armature.

[Printed, 1s.]

A.D. 1855, December 14.—N° 2828.

WHITEHOUSE, Edward Orange Wildman.—" Improve-" ments in apparatus for measuring fluids."

In the Provisional Specification this invention is said to consist of:—

1st. " A peculiar mode of obtaining, by means of centrifugal " force," a continuous rotation "for the purpose of measuring " or registering the flow of any fluid."

2nd. "The application of magnetic force or attraction as a " means of 'coupling,' or 'gearing,' for transmitting mechanical " motion, and which may be termed 'magnetic coupling.'"

In applying this portion of the invention to the 1st improvement, there is "no *mechanical* connexion between the motor part " of the apparatus and the registering part or 'count,'" the motion being transmitted by a magnet or piece of soft iron fixed on the motor wheel, which acts on a piece of soft iron or a magnet fixed upon the axis of the first wheel of the count. This arrangement enables the count to be enclosed in a separate case to the motor part of the apparatus.

The 2nd improvement is not mentioned in the Complete Specification; but it is therein proposed to employ a mode of driving the count " by the action of magnetism, as described in " the Specification of Letters Patent for England, granted to

"Charles William Siemens, on or about the 15th day of April,
"1852" (See N° 14,060, Old Law, *Appendix*).

[Printed, 1*s*. 2*d*.]

A.D. 1855, December 17.—N° 2856.

SMALL, Andrew.—"Improvements in marine compasses, and "in apparatus applicable thereto."

The outer bowl of a compass is supported in gimbals, and has the following arrangement connected with it "for the purpose of "ascertaining the error or deviation of the compass needle:"—

"A 'dumb compass' circle," graduated, and adjustable; an "equatorial ring," attached by pivots to the dumb compass circle, and "graduated with the hours from noon;" "a 'true "'meridian' ring," rivetted at right angles to the "equatorial "ring," "marked with degrees of latitude or altitude," and "slit on each side for taking the bearings of lights or headlands;" "a moveable hour circle," jointed to the "true meridian ring," "at points corresponding to the poles," capable of being set to any hour upon the "equatorial ring," and slit along its centre line so that objects can be viewed through it; and a segment centred on the stud connecting the "hour circle" to the "true meridian "ring" having a centre to receive a stile. The studs on the "dumb compass" ring carrying the "equatorial ring," "also "serve to carry the inner bowl containing the compass card and "needle." A stile is also placed on the "hour circle" stud.

To ascertain the error of the compass, the dumb compass circle is set round until the true meridian circle is brought into the north and south line, shown by the compass needle; the equatorial circle is set to the latitude of the place; the hour circle to the hour of the day on the equatorial circle; and the dumb compass circle is shifted until the sun either casts a shadow from the stile on to the centre line of the segment, or is seen through the slits in the hour circle. The angular difference between the true meridian circle and the north and south points of the compass needle is the deviation or error required.

A small magnet may be placed on the hour circle stud to correct the needle's deviation. When this improvement is applied to a steering compass the meridian circle is placed parallel to the ship's keel, whilst the other circle crosses the keel transversely;

the magnets on the meridian circle are adjusted for north and south courses, and those on the other circle for east and west courses.

[Printed, 6d.]

A.D. 1855, December 18.—N° 2860.

HUMASTON, John Pierrpont.—"Improvements in instruments for composing and transmitting telegraph messages."

This invention relates to certain improvements that are applicable to any mode of telegraphing "which requires the intermittent "opening and closing of the circuit to form the signs for letters, "figures, &c."

The improvements consist of:—

1st. "A machine which is termed a 'telegraphic compositor.'"

This machine is to punch holes in a strip of paper "in the order "and shape necessary to form the required characters on the "recording machine at the opposite end of the line of wires" [See N° 11,480, Old Law]. A set of suitable punches are so arranged that by depressing a finger key which corresponds to a certain letter or character, "a hole or set of holes and spaces, of the "proper shape for that purpose, will at once be punched through "the fillet of paper placed in a direction to receive it."

Component parts of the machine.—The finger keys are connected with a series of spring pins by means of levers, springs, and cords; these pins are made to select the punches for stamping the paper by the intervention of a "wheel" or drum having projections on its surface corresponding to the characters to be punched. A treadle actuates a cam shaft, which gives suitable motion to certain levers by which the punching of the paper is effected; the paper is moved forward also by a lever acted on by the cam shaft, which rotates certain rollers, an amount determined by a notched wheel against which the cam lever strikes.

Punching the holes.—On the depression of a key a certain spring pin is thrust out, its helical spring in that case being allowed to act; the letter wheel is thereby stopped at such a part of its revolution (it having a tendency to revolve) that the proper projections rest upon the punch links and keep down those that are required to form the letter until the cam lever has struck them forward and punched the paper; those punch links that have not

been kept down by the letter wheel are risen out of the way of the cam lever by helical springs under them.

Feeding the paper.—As this requires to be in proportion to the length of the perforations necessary to form each letter, the throw of the cam lever is determined by a wheel fixed on the axis of the letter drum and having notches corresponding thereto. To the cam lever is attached a cord, which, by passing round a suitable pulley, moves the paper roller; the connection between the paper roller and the pulley is by means of a ratchet wheel and click, thereby enabling the cam lever to return to its original position without influencing the paper.

Action of the machine.—When the key of any particular letter is pressed down, the punch links are selected accordingly, as above explained. The treadle is then depressed by the foot, thereby giving the required amount of feed to the paper and driving the selected punches. "The foot is then raised, and the two levers "are restored to their former points." The key is kept down during the whole process, "and until the key for the succeeding "one is operated, when the process continues as before."

2nd. A "method of transmitting the composition over the "wires."

The perforated paper is drawn rapidly between metal rollers included in the electric circuit; the upper roller being suitably shaped to enter the perforations and mounted at the extremity of an arm acted upon by a helical spring.

"This process may also be reversed by employing a strip of "conducting material in lieu of the paper, or by rendering the "characters stamped upon a strip of paper conducting, by the "application of a suitable substance to the paper by means of the "punches, and connecting the wires accordingly."

3rd. A method of preparing "a type stick, or of setting up "types, for composing messages to be transmitted by electric "telegraphs." The stick is filled with types, and certain "links "or tumblers" are caused to act upon them progressively by means of the letter wheel mentioned in the 1st improvement, thereby pushing back those types that are not required to send signals; the other parts of the "composing" machine "operating substantially in the manner already described." The type stick has rack teeth on its back to move it forward either during composition or during the transmission of the message.

[Printed, 2s. 5d.]

A.D. 1855, December 18.—N° 2862.

PRICE, DAVID LLOYD.—"Improvements in electric telegraphs, "and in appliances connected therewith, as applied to railway "trains and fixed stations."

These improvements may be described under the following heads:—

1st.—Employing a coiled spring as a means of establishing electrical connection between the carriages of a railway train.

For this purpose "a coiled spring" is employed, similar to a "clock spring, but which has a tendency to recoil and draw itself "within a small circular case fixed to the carriage."

"When two or more wires of communication are required," an internal recoil spring is employed which does not form a part of the electric circuit; on the reel actuated by the spring is wound the wires, "enclosed in gutta percha or other suitable pliant "material." The reel is formed in two parts insulated from each other by a line at right angles to the axis, each of which parts carries its own conducting wire and has an external "coiled spring" to conduct the current from the "line wires of the carriages" to the "coiled wires." "By this means two or more line wires may "be connected by pulling ou. a single strap or by a single pull."

2nd.—"Forming the immediate points of junction of the con- "nections between rail carriages, so to have a double locking, or "hold the one part with the other when united."

"Each terminal consists of a metal plate, having a round hole "and slot for the reception of a headed pin, the head passing "through the round hole, and the neck fitting the slot when "drawn back. These pins project on each side of the plate, and "the two connecting plates, forming a pair, are precisely similar, "so that the pin of each plate enters the slot of the other plate "simultaneously, forming a double connection, and this irre- "spective of which plate is placed uppermost, by reason of the "pins projecting on both sides of such connecting plates."

3rd.—Certain improvements "in the telegraph instruments and "conducting parts connected therewith" such that a bell and needle telegraph are enabled to be worked by one line wire.

The principal improvement is the arrangement and construction of the signal key.

In an instrument and arrangement for transmitting and receiving audible signals only, the key consists of a spindle having projecting studs, worked by the movement of a handle. Two of these studs are connected to the line wire and the third to one pole of the battery; the studs deflect against springs in connection with the other terminals, and in their normal position are kept so as to receive signals by the action of a helical spring upon the handle arm. A coiled spring (See 1st improvement) makes connection between the third stud and the battery. A centrifugal bell-hammer, set in motion by the release of a clock train, is used to sound the bell; the clock train is released by the attraction of a lever armature by the alarum electro-magnet.

In an instrument and arrangement for transmitting and receiving both visible and audible signals the key is constructed in a somewhat similar manner; there are, however, only two studs (insulated from each other), and these are respectively connected with the poles of the battery; the deflection of the studs against springs connected with the line-wire circuit and in contact with pins that form the terminals of the instrument coils, sends the current in one direction or the other. The battery employed to send signals to a distant station, forms a local battery actuating the alarum electro-magnet when signals are received; for each instrument comprises a "needle coil" and electro-magnet in the line-wire circuit, and another coil which releases the alarum clock-train; the latter electro-magnet being in the local circuit. The local circuit is completed when the line-wire-circuit electro-magnet is excited.

To prevent the accidental ringing of the bell a piece of leather, attached to the armature, may be interposed between the hammer and the bell except at such times as the armature is attracted by the magnet.

To retain the signalling handle in one position for sounding the alarum at the distant station a metal pin is used, which also ensures the completion of the circuit, as it is inserted into a hole suitably placed and in the electric circuit.

By means of a spring and "thumb knob" the action of the local battery and bell may be suspended whilst receiving a communication.

[Printed, 1s. 5d.]

A.D. 1855, December 18.—N° 2867.

GLOVER, Frederick Robert Augustus.—"An improved "instrument or apparatus for taking angles, and measuring lines, "surfaces, and solids, and ascertaining the variation of the "needle."

This invention is an improvement upon a former invention, for which Letters Patent, N° 8256 (Old Law), were granted to the Patentee; and consists in appending to the instrument described in the said former invention certain additional lines, also a reflector and compass needle for the purpose of enabling the variation of the needle to be ascertained by a double azimuth observation.

The apparatus consists of two arms or limbs, with suitable divisions on them, and moveable from a centre. In the present instrument, an additional set of divisions for angular magnitude is marked on a circular disc, concentric with the centre of motion of the limbs, and moving with one of them against the other; a reflector stands upon the disc, and a magnetic needle is appended.

To ascertain the variation of the needle by a double azimuth observation, the instrument is placed horizontal, and the zero line of the divided disc in the direction of the assumed true north, by means of the magnetic needle. At any time before noon a ruled line on the mirror will be reflected somewhere on the disc of the instrument. At the same time after noon, if the assumed north is correct, the before-mentioned shadow will be reflected on to the disc, at an equal angular distance on the other side of the zero line. If the shadow falls on the angle indicated by the first observation, before or after the same time after noon that the first observation was taken before noon, "any number of degrees that "intervenes, divided by two, and added or subtracted (as the case "may require), to the assumed variation, will give the true."

[Printed, 6*d*.]

A.D. 1855, December 21.—N° 2895.

TYER, Edward.—"Improvements in telegraphing or communi- "cating by means of electricity."

The improvements in indicating apparatus consist "in the use of "a soft iron needle suspended between the poles of a permanent "horse-shoe magnet, and acted on by an electro-magnet, rendered

"magnetic by the passage of the line current." The pivot of the needle is placed near the pole of a bar electro-magnet; to cause the deflection of the needle by the polarity thus induced, its point is free to vibrate between the opposite poles of a horseshoe permanent magnet; "a dead-beat movement" is thus produced. To cause a "vibratory" movement of the needle two horseshoe permanent magnets act upon the needle at opposite sides of the axis; the centre of gravity of the needle being kept below the centre of suspension by an adjustable weight; in this case the needle is horizontal when at rest. The "dead-beat" instrument may complete the circuits of recording instruments, when the needle rests against stops; if the recording surface is driven by a clock, the time a certain signal was indicated may be recorded.

An arrangement of commutator or pole changer, by which the outgoing current is directed "through one instrument or indicator, "and the incoming current through another instrument or indi- "cator." The incoming current passes "along a spring which "bears on a metallic point, from which the spring is raised when "the commutator is acted on," to send a signal; "thus, one in- "strument is thrown out of circuit whilst the current is passed "by the commutator through the other." In the commutator shown, piston rods carrying insulated connections with the battery make connection with flat springs connected with the indicating instruments; two pistons are used, one to each direction of the outgoing current.

A magneto-electric apparatus for communicating between the different parts of a railway train. This is worked by the motion of the train; the coils or permanent magnets for that purpose, being either mounted on a carriage axle, or driven therefrom by means of a band.

An alarum to give signals on railway trains. To prevent the clockwork detent from being released by the oscillation of the train, it is connected with a piece of soft iron, which is acted on by two electro-magnets; "one of these is kept in action by the "all-right signal, and holds the detent in its place, and the other "is brought into action by the danger signal, and withdraws the "detent." A third electro-magnet is included in the danger-signal circuit, which withdraws a spring bolt from the tail of the detent lever when the alarum is required to act. Instead of retaining the last wheel of the train by a detent, a break bearing

against it may be used; in this case the spring bolt and third magnet "may be dispensed with."

[Printed, 7*d*.]

A.D. 1855, December 26.—N° 2924.

McCALLUM, David.—" Improvements in electric telegraphs."

This invention "consists in employing mechanism acted on or " governed by electric currents in such manner that separate or " detached symbols of different colors or otherwise of different " significations, may be separated and accumulated in succession, " and according to settled or agreed-on codes, so as not only to " telegraph by such symbols, but also for a time to record the " communications made."

" For this purpose it is preferred to employ light and small " spheres of different colors, though other forms of separate and " independent symbols may be used in place thereof. The " electric apparatus is arranged to work by electro-magnets or by " the deflection of magnets, so that at each action of the keys or " handles a sphere or other separate and moveable symbol may " be detached from a number of like symbols, and according as " like or different symbols are detached (according to a code), " so will be the nature of the communication made; and such " communication may be kept composed in the receiving " apparatus for any desired length of time, and till the several " symbols composing it are distributed for further use."

" When spheres of different colors are employed as the symbols, " then the most convenient receiver will be a series of zig-zag in- " clined grooves formed on an incline board or surface glazed in " front, or a spiral" [helical ?] " groove around a cone or cylinder " surrounded with glass; but the form of the receiving apparatus " as well as of the symbols may be varied."

" Alphabets may very readily be formed by the use of symbols " of two different colours, using a third coloured symbol to " separate, and for giving agreed-on signals." Figures may be similarly represented.

[Printed, 1*s*. 3*d*.]

1856.

A.D. 1856, January 1.—N° 3.

CALVERT, JOHN.—(*Provisional Protection only.*) "Improve-"ments in extracting metals from their ores."

"This invention consists in the application of electricity to "facilitate the decomposition and extraction of metals."

This is effected "by passing an electric current through the ore "whilst in the furnace, thereby compelling the metal either to "precipitate in contact with an electrically opposite substance, or "to aggregate in nodules. The old process of sweating and "washing" is adopted, "using the cheaper kinds of fluxes than "those at present used in that process. Sometimes while in the "furnace, or after taking from the furnace," "the old method of "immersing the ore in water, or applying the same to it" is adopted; "but in addition to this old method" the water is charged "with an opposite substance to the 'base' of the ore, "that is, for instance, if the ore be quartz or acid base," the water is charged "with alkali, taking care in most instances, to "keep the vessel in which the immersing takes place under "electric influence."

"In the case of such ores as are not suited for furnace treat-"ment," "the electric and opposite arrangements" are brought "into play on the ores, under a slow liquid or fluid electric de-"composition, thereby bringing them into solution, and acting "upon them while in solution;" the decomposition is engendered "either by bringing ores of an opposite nature to act upon each "other (for instance, the oxide of tin in opposition to the sul-"phuret of copper, or the sulphuret of iron in opposition to the "carbonate of iron), or where this is not convenient through "scarcity of the necessary ores," then metals are used, and sometimes "the known or suitable acidulous solutions used for "electrical decomposition" are introduced. The action of the said acidulous solutions may be assisted "by the addition of an "opposite substance (such, for instance, as an alkali in opposition "to an acid base)."

Carbon may be used, "either in the furnace process, or that last "mentioned."

[Printed, 3*d.*]

A.D. 1856, January 1.—N° 7.

THURRELL, JOHN, MULLER, ELIZABETH MARY, and CHIDLEY, JOHN ROBERT.—(*Provisional Protection only.*) "Improvements in transmitting fac-simile copies of writings and "drawings by means of electric currents."

The writing or drawing to be transmitted is written or drawn "upon a conductor of electricity," with a varnish or other non-conductor.

At the transmitting station a metal cylinder has the writing (written as described above) placed upon it, and revolves so that a "magnetised point" or roller, traversing to and fro, passes over the writing. There is also a voltaic battery at the transmitting station, and a single line wire is used.

At the receiving station another similar metal cylinder, moving at the same speed as that at the transmitting station, has writing paper placed upon it. "A fac-simile of the transmitted writing "or drawing is traced or inscribed by the agency of electro-mag-"netism" on the said writing paper; a pencil or other marking point or instrument, being caused to traverse in a similar manner to the "magnetised point."

On the cylinders being put into motion, and the electric current being allowed to traverse the transmitting cylinder, "mag-"netized point," and telegraphic circuit, whenever the electric current is unbroken the marking point at the receiving station makes a continuous mark or line upon the paper; but when the transmitting point comes into contact with the non-conducting material, the receiving point ceases to mark the paper; "and thus "it will appear evident that a fac-simile copy of the writing or "drawing to be transmitted from one station will be traced upon "the receiving paper at the other station."

[Printed, 3*d.*]

A.D. 1856, January 5.—N° 45.

KAMMERER, RAYMOND, and BREWER, CHARLES.—(*Provisional Protection only.*) "Improvements in electric clocks or "timekeepers."

The nature of this invention is as follows:—

A pendulum is made to oscillate between two horseshoe electro-magnets by means of a commutator on the escape-wheel axis, and an armature of "magnetised metal" attached to the pendulum.

"The pendulum is connected to the escapement, by which the "hands of the clock are put in motion."

"In order to change the current of electricity from the positive "to the negative pole and vice versa, a small cylinder of ivory is "placed upon the arbor or axis of the escapement wheel; at each "end of the ivory cylinder is fitted a small disc of brass, having "two narrow slips of the same metal projecting from each. The "discs are fitted to the ends of the ivory cylinder, so that the pro-"jecting slips of metal are equidistant. Two light springs, to "which the wires of the battery are attached, press upon the "discs; two other springs connected with the clock are fitted to "press alternately upon the slips of metal projecting from the "discs; as the ivory cylinder rotates with the axle of the wheel, "the contact is alternately made and broken and the current "reversed."

"The clock may be actuated either by plates of metal buried in "the earth, or by a sustaining galvanic battery."

[Printed, 3d.]

A.D. 1856, January 12.—N° 91.

OUDRY, Charles François Leopold.—"Certain improve-"ments in the preservation of metals and other solid substances."

This invention consists of "the preservation of metals, alloys "of metals, wood, and other solid substances, by means of a me-"tallic deposit, effected by electro-chemical processes, on the arti-"cles to be preserved, having previously received a coating of an "isolating and protective composition."

The composition is made of metal or metallic salts combined with oils, resins, gums, or bitumens. This is metallized by means of copper, graphite, or other metallic powder, and copper electro-deposited upon the article, using "a bath of sulphate of copper."

Various examples of the application of this process are given, principally relating "to covering the hulls of iron and wood "boats." In the case of an iron boat the adherence of the de-posited copper to the coating, and of the coating to the iron is ensured by rivets. "In cases of casualties at sea, by which the "copper coating on the hull of a ship might be partially removed, "the isolating coating will prevent the galvanic action, which "would rapidly destroy the iron, from taking place, and will enable "the repairs to be easily effected."

[Printed, 3d.]

A.D. 1856, January 14.—N° 103.

ULRICH, John Gottlieb.—"Improvements in chronometers "and other time-keepers," consisting of:—

1st. Certain improvements in "compensation curbs," &c.

2nd. Certain contrivances for rendering the vibrations of the balance spring isochronous.

3rd. "Improvements in the compensation balance of the ordi-"nary construction, for making it useful for every change of tem-"perature from zero to 130° of Fahrenheit, and destroying its "tendency to being affected by terrestial" [terrestrial?] "magne-"tism, or local attraction, on board of iron ships in particular."

In reference to preventing magnetic force from influencing the balance, the following are the improvements set forth:—In old chronometers, "a thin armature of iron" is "connected to the "laminæ" "by screws" so as "to connect the magnetic current, "the same as is done by the armature of a common horse-shoe "magnet." In new chronometers, metals "not subject to mag-"netism" are used, such as brass, silver, "aluminium" [aluminum?], or palladium.

4th. Suspending the chronometers in "gymbals."

5th. "Improved bolts or stays for securing the chronometer "when being carried to or from the ship, or elsewhere."

6th. "Certain contrivances for preventing the detent of the "usual detached escapement from the concussion which takes "place in coming to its banking screw."

7th. "Certain improvements upon the lever escapement for re-"ducing the amount of friction in unlocking and receiving of "impulse, and in the guard for the prevention of tripping."

8th. "Certain improvements upon" "remontoire escapements, "chiefly to clocks and regulators."

9th. "Certain improvements upon the compensation pendulum, "and other kinds of compensation for clocks and regulators, in-"stead of a compensation pendulum."

[Printed, 1s. 6d.]

A.D. 1856, January 16.—N° 117.

HAMILTON, John, junior.—"Improvements in the posts or "uprights employed in constructing electric telegraphs."

This invention refers to the posts used to suspend the line wires in the air. "Each post or upright is constructed as follows:—A "cast-iron plate or foot is formed with an upright tubular socket; "such socket is at its lower parts made with openings, so that the "earth may fall through and fill in the interior of such socket. "The upper part of the post or upright is made of a tube of "wrought iron, by preference coated with zinc, and its lower end "enters the socket, and is fixed thereto by rivets, or otherwise. "The socket rises to some inches above the earth. The top of "the post is covered in with a cap, to throw off the rain from the "post, and a transverse bar or bars of wood is or are fixed to the "upper part of the post or upright to receive the wires."

The Drawings show a post with a foot having four ribbed arms hollowed out underneath, and with metal arms for suspending the telegraph wires; those metal arms are preferred whose ends "form "metal caps for covering the glass or earthenware insulating in-"struments."

[Printed, 5d.]

A.D. 1856, January 18.—N° 133.

TREMESCHINI, GIUSEPPE ANTONIO.—"Improvements in "electro-telegraphic communications," consisting of:—

1st. Apparatus for receiving the electric despatches, which "is "furnished with the requisites of Morse's printing and of the "ordinary dial apparatus."

In one instrument "several parts similar to those employed in "Wheatstone's or Breguet's dial telegraphs" are used (in connection with the motion of the paper), to work the dial hand, the paper being moved uniformly by clockwork. The "points and "lines of Morse's alphabet" are made by an "impression wheel" on the dial-hand axis; the motion of this "impression wheel" and of the dial hand being controlled by an electro-magnet and escapement armature actuated by the transmitter of the message through the line-wire circuit. A wheel with one tooth only revolves with the dial hand, and by indenting the paper at certain equidistant intervals, gives "the control for the acci-"dental errors which may occur in the transmission."

In a second instrument clockwork is dispensed with, the paper and dial hand being driven by a weighted roller in combination with suitably placed tubular curved levers in which steel balls

iove. The points of the curved levers also serve to impress the aper.

2nd. An improved "manipulating apparatus" in which the perator is not "obliged to keep the key in the depressed position "till the signal is transmitted." The under end of each key "has a metallic type," or mark in relief; the key is kept depressed by a catch till it is liberated by a revolving arm moved by clockwork, which closes the line-wire circuit and transmits a signal.

3rd. "A new key or alphabeth" for transmitting secret despatches. This instrument "consists of a table divided in an "undeterminated number of lines, each of which is subdivided in "as many compartments as there are letters in the alphabet to be "employed, and to which is annexed a compartment for the "intervals between the words. On the first line the alphabet is "inscribed in a regular, whereas on each of the others in a different, "irregular manner. In order to form or to decipher a dispatch, "it will be required for finding the letter in the lines and com-"partments of the key, to follow the rule which has been agreed "upon, previously observing that each line has to furnish only "one letter at the time."

4th. "The construction and application" of an "improved "commutator and pulsator." The object of these appliances is to afford to a circuit with intermediate stations all the conveniences of a continuous circuit. The line-wire circuit may by the pulsator be closed at regular intervals, the commutator being adjusted accordingly. A wheel with one cog, which is revolved by any suitable motive power, completes the circuit once every revolution by means of suitably placed levers. Whenever the circuit is uninterrupted it attracts the keeper of an electro-magnet, which sets free the above-mentioned single tooth and causes the circuit to be intermitted by the action of the tooth against the levers; this continues until the circuit is again interrupted, when the wheel is again stopped. When a message has to be transmitted to neighbouring stations they are placed in connection with the earth circuit, but not otherwise.

[Printed, 1s.]

A.D. 1856, January 19.—N° 155.

ROBERTSON, CHARLES.—"Improvements in mariners' com-"passes."

The object of this invention "is to enable the navigator to

" detect at any time the amount of variation and deviation of the " compass in iron and other ships."

"On the glass which covers the compass card an index or " pointer is mounted, which turns on a centre in the middle of " the glass. On this index a style is mounted, from which a " shadow is thrown by the sun, and the index is set to the di- " rection of the shadow, which, if the time be noon, will be due " north and south, and at any other time the due north and " south is readily calculated from the direction of the shadow. " There is also a sight placed at the end of the index, by which " the direction of the sun is directly observed, and the index set " accordingly when the sun is near the horizon."

The Drawings show a pointer or index whitened to render the shadow clearly visible, also wide at one end to receive the shadow of the stlie, and pointed at the other end to compare its direction with that of the compass card below. A joint is also shown " which fits on the end of the style to lengthen the shadow when " the instrument is used in low latitudes." When viewing the sun direct a piece of colored glass is used, whose moveable socket fits on to the stile, and turns about it as a centre.

[Printed, 6*d.*]

A.D. 1856, January 25.—N° 198.

SHANKS, Andrew, and WENHAM, Francis Herbert.— "Certain improvements in water guages."

The Patentees " use a float in the steam boiler (or other vessel), " as is common in such cases," and the "improvements consist " of rings of iron or steel, moving loosely and freely on the out- " side of a tube which is placed directly over the float," [and?] " a staff or rod to the lower end of which is affixed the said float; " the upper end" [of the rod?] "carries a magnet, whieh moves " freely and vertically inside of the tube on which the aforesaid " iron or steel ring is operated upon by the magnet within said " tube, thereby showing externally the vertical movement of the " float or water level inside."

The Drawings show a horseshoe magnet, which acts upon an iron ring; the arms of the magnet being parallel to the rod, and the poles turned slightly outwards towards the ring. Suitable guides preserve the rod vertical.

[Printed, 6*d.*]

A.D. 1856, January 26.—N° 216.

STATHAM, SAMUEL.—"Improvements in electric telegraph "conductors."

This invention "consists in forming a metal conductor, which "will extend or stretch not only in the manner and to the extent "of an ordinary wire or strand, but whose greater extension is "due to the manner in which it is constructed."

The improved conductor is formed "of a hollow strand or cord "of metal wires laid spirally" [helically?] "by any suitable ma-"chine, or of wires formed into a hollow tube by a braiding or "other machine, and in either case with or without a core of "gutta percha, caoutchouc, or other elastic material." "Copper, "iron, or any other suitable wires," are employed, and the hollow conductor formed "of a diameter proportionate to the extent to "which it may be required to be stretched," and the wires are laid "more or less loosely according to circumstances."

One mode in which the hollow conductors are made "is by "laying a number of wires spirally" [helically?] "round a mandril, "which may be slightly tapered if required, and from which the "hollow cord is drawn off by any suitable means. The size of "the mandril, the size and number of the wires, and the length "of lay, regulate the amount of extension which the conductor "when made will admit of."

Instead of a tubular conductor "a plaited or braided band" may be used, made up loosely of metal wires and "threads of "india-rubber, gutta percha, or their compounds."

[Printed, 3d.]

A.D. 1856, February 4.—N° 301.

CLARK, EDWIN.—"This invention has for its object an im-"provement in the apparatus for suspending insulated electric "telegraph wires."

"For which purpose, the arms and the caps, by which the sus-"pension above the earth is accomplished, in place of being made "separate in each case, are made of one piece of metal or other "suitable material, and the cap and arm is made with a gutter to "carry off rain from above the insulator, which is suspended within "the cap."

The Drawings show two methods of carrying out this invention.

In one instance the metal cap is of curvilinear vertical section and completely covers the insulator. In the second instance the metal cap and insulator fit, the insulator projecting slightly beyond the metal cap; the cap and insulator shed are conical.

"The arms and inverted hollow caps are best made of one piece "of cast iron, the wrought iron or other metal may be used, and "even earthenware might be employed."

[Printed, 5*d*.]

A.D. 1856, February 6.—N° 324.

DE SAUTY, Charles Victor.—(*Provisional Protection only.*) This invention relates to "the prevention of the leading or "fouling of fire-arms;" its nature is as follows:—

"The coating or covering, by means of electricity balls, bullets, "and shot, whether for cannon, rifles, guns, or pistols, made of "iron or lead, and of any shape or size, with a coat or cover of "copper or other suitable metal, preferring copper for cheapness, "and by reason of its easy and rapid deposition."

[Printed, 3*d*.]

A.D. 1856, February 8.—N° 335.

WOODMAN, John.—(*Provisional Protection only.*) "An im"proved telegraph insulator."

"Instead of cementing the stalk of the hook through which the "wire passes into a thimble, and cementing the said thimble into "a cylindrical chamber of a cast-iron bell," the Inventor makes "the bell open at the back, with a cap or cover to fit closely on "it." "The stalk of the hook or eye" is fastened "into a "conical shaped non conductor; this non-conductor, with the "hook or eye," is passed "through the bell at the back, and by "its conical shape, the smallest part being foremost, forms a "wedge, whereby it is evident the more stress or strain comes "upon it the tighter it will fit, and thus become water-proof; and "as an additional tightener" an elastic ring is put "round the "thick end of the non-conductor, which causes it to fit perfectly "close, and the cap or cover aforesaid being then put on, and "secured by a peg or pin preserves it from the weather or "accident."

"It is evident, that by this plan, whenever the hook or eye "becomes broken or out of order it may be taken out and

" repaired, or replaced with a new one, without disturbing the " whole of the insulator, by merely taking off the cap or cover, " and taking out the non-conductor and hook or eye."

[Printed, 5*d.*]

A.D. 1856, February 14.—N° 385.

MOREWOOD, Edmund, and ROGERS, George.—" Improve-" ments in drying and coating iron and copper," consisting in :—

1st. Drying sheets, &c. of iron or copper after being cleansed or coated by immersion in a bath. The sheets or other suitable forms are caused to pass between pressing rollers, preferred to be of wrought iron, and made hollow so as to admit of being heated by steam or otherwise. If the plates come out insufficiently dried, the drying is completed " by laying them for a sufficient time on " a rack placed immediately over the heated rollers."

2nd, " Causing sheets of suitable forms of iron or copper " (coated or uncoated with other metal), when coating them with " varnish or water-repellant matters " (as described in Specifications of former Patents granted to the Patentees), " to be " subjected to pressure between rollers to equalize the varnish or " water-repellant coating thereon." When only a part of the metal is varnished the pressure of the rollers spreads the coating, " and causes those parts not previously coated to become so."

3rd. " Using bars, racks, rods, or wires, which are fixed and " immersed in the coating fluid, and which act as stays or supports " to the iron or copper to be coated in the solution," enable such iron or copper to be moved with great facility, " and at the " same time aid electrically in causing metal to be deposited from " solution upon the pieces of iron or copper."

Either the electricity generated by the contact of the metal with the articles to be coated, or that from a separate battery is used. For depositing zinc a solution of chloride of zinc is used, and for tin a solution of chloride of tin. The articles are preferred to be moved about from time to time, and occasionally cleansed with a stiff hair brush and replaced.

[Printed, 4*d.*]

A.D. 1856, March 7.—N° 573.

HOLMES, Frederick Hale.—" Improvements in machines " known under the name of magneto-electric machines."

The object of these improvements is to obtain "powerful, uni-"form, and continuous currents of electricity, always flowing or "passing in the same direction."

"Currents of electricity thus produced" "may be used for all "purposes in place of" those "obtained from the more expensive "galvanic battery," but, more especially for the following purposes:—"First, for the purpose of producing (in combination "with a proper apparatus) what is well known as the 'electric "'light' for light houses, ships, and signals; secondly, in the "manufacture of iron and steel, for the purpose of obtaining a "better product and in less than the ordinary time; thirdly, in "the separation of metals from their ores in any of the ways "already proposed for applying the agency of electric currents; "and, fourthly, in the process of making coke for the purpose of "separating the sulphur."

The improvements consist in:—

1st. "The symmetrical arrangement" of "the helices and mag-"nets." The horseshoe permanent magnets are fixed to the framing of the machine, so that their axes or legs radiate around the driving shaft, the line joining the poles of each permanent magnet being at right angles to the axis of the driving shaft; the permanent magnets are thus mounted in the circumferences of circles, and in different planes, between which wheels keyed on to the driving shaft and bearing helices revolve. The helices of each wheel have their axes parallel to the driving shaft, and are divided into sets, whose terminals go to the commutator, the connections of each set being alternately between the exterior and interior terminals. "The magnets are so arranged that their "poles occur at regular intervals around the circumference of the "wheels which carry the helices, and the helices are also arranged "so on any one wheel, that the centres of all the helices are always "in a similar position with respect to the corresponding poles of "the magnets at every part of their revolution. When a machine "has several wheels of helices, whatever the number, it should be "an even one; and the first, third, fifth, &c. should be placed on "their axle in such a manner relatively to the second, fourth, "sixth, &c. wheels, that when the centres of the ends of the "helices of the first series in revolving have arrived at a given "point, the helices of the other series will have their centres "opposite a point a little in the rear thereof."

2nd. "An improved commutator and improved conductors, "and in the manner of mounting these conductors, so as to do "without any kind of lubrication on the commutator, and at "the same time to avoid creating the series of sparks on the "passing of the conductors over the divisions of the commutator." "The commutator consists of two brass or copper insulated bands "or rings," with projections, those of one ring alternating between those of the other ring. These rings are mounted on the axle of the helix wheels, and revolve therewith, and the alternating projections "present a metal track to the metal surfaces for con"ducting off the electricity." The conductors forming the poles of the apparatus "simultaneously bear alternately upon the parts "of the commutator which are respectively transmitting the "induction and eduction currents."

"The point of contact of the conductors with the commutator "is varied" by the action of the governor "which receives motion "from the motive power engine employed to drive the helix "wheels." It is found necessary thus to vary the point of contact as the induction of electricity in the coils commences at different distances from the permanent magnets, which distances vary with the velocity of the helix wheels; the spark is thus avoided. The conductors are mounted on opposite ends of a "moveable segment "frame," which is supported "by rollers in such a manner as will "admit of the frame moving axially;" this frame is connected with the governor rod by means of an arm and roller (having a single tooth), so that any alteration of speed in the commutator is accompanied by a proportionate alteration of the point of contact of the roller with the commutator.

[Printed, 10*d*.]

A.D. 1856, March 10.—N° 580.

CHABLIN, Léon, and HENNIQUE, Antoine.—(*Provisional Protection only*.) "A new mode of ornamenting ceramic and "vitreous products."

"This invention consists of an improved process of ornament"ing china, porcelain, glass, and other like materials, which "process is as follows:—

"The design is made upon the article to be ornamented by "means of a brush dipped in a paste composed of chloride of

" silver mixed with spirits of turpentine to a proper consistence. " When the design is finished the article is placed in a muffle " furnace and heated to a red heat. When the article is cold it is " surrounded with copper wire, and placed in an electro-plating " solution of silver or gold, as desired, and the metal is depos- " ited by the usual galvanic battery. After being left in the bath " about forty-eight hours, or when a sufficient thickness of metal " is obtained, the article is taken out and the design is finished " by means of a burnisher or brush in the usual manner. The " same process is used for ornamenting enamel."

[Printed, 3d.]

A.D. 1856, March 17.—N° 639.

GRAHAM, William.—" Improvements in marine compasses, " and in adjusting the same on board ship."

1st. " Various improved mechanical applications and arrange- " ments connected with the mariner's compass, and intended for " the purpose of neutralising or correcting the effects of local " attraction upon the compass needle or needles."

This improvement " is to a certain extent based upon or con- " nected with an invention for which British Letters Patent " were granted to John Sands, as a communication from Wil- " liam Graham, and bearing date on or about the 30th day of " November, 1854," (See N° 2521, 1854).

The corrective magnets are preferred to be arranged radially from the centre of the compass card and are capable of minute adjustment; the centre point carrying the compass card or the gimbals are also adjustable vertically. The magnets are " at or " near the level of the compass card or needle."

2nd. " Adjusting the compass on board ship."

One pair of corrective magnets are fixed fore and aft, so as to cause the compass needle to point correctly with the ship's head in a given direction; the ship's head is then turned, and any deviation of the compass needle from the true bearing corrected by a second pair of magnets disposed " so as to occupy the pre- " cise positions with relation to the earth which the first pair " occupied before shifting the ship's head." The last adjusted pair of magnets is removed and placed as much away from the vessel's second position as they were before removal, but on the other side of the line of the vessel's keel, at the same distance from

the centre of the card. A third pair of magnets complete the adjustment by being placed in the position from which the second pair of magnets were taken, the direction of the ship's head still remaining in the second position. Or the ship's head may be turned, instead of shifting the second pair of magnets, and the third pair of magnets applied at right angles to the second pair. Other methods of adjustment depending upon the same general principles may be resorted to.

The Drawings show a compass binnacle as arranged for carrying out this invention. The "sockets" or bearings of the outer gimbal ring are adjustable vertically by means of screw spindles, and the compass card "is suspended by jointed links" to a "pivot "piece" which rests in a metal step "set on a piece of vulcan-"ized caoutchouc in the top of the pedestal." The pedestal "is "hollow to allow of the movement of a weight attached to the "piece which supports the pivot." It is preferred to use two parallel compass needles. In order still further to prevent the effects of vibration on the compass needle, the compass box rests on an India-rubber ring or on "suspensory links, chains cords "or springs."

[Printed, 7*d.*]

A.D. 1856, March 22.—N° 677.

JOHNSON, John Henry (*a communication from Monsr. Louis Bolmida*).—"Improvements in weaving by electric power, "and in the machinery or apparatus employed therein."

"This invention relates to certain improvements in the general "construction and arrangement of looms suitable either for plain "or figure weaving;" in these looms electro-magnetic power is used to actuate the jacquard needles, and to change the shuttles.

The general arrangement of the loom is "similar in most "respects to those already in use."

"*The electric apparatus for replacing the ordinary card jac-"quard.*"—The needles which actuate the hooks, and thence the healds, are pushed forwards (instead of backwards as usual), "those not wished to be actuated being prevented from moving "by stops presented by the magnetic apparatus;" the stops or spindles of those needles that are to act are drawn on one side by the attraction of the electro-magnets belonging to them, the

electric current only exciting those magnets which are to remove stops. All the armatures are in constant contact with the electro-magnets, but only those whose electro-magnets are active are drawn into an oblique position by a slight lateral motion of the magnet frame. In order to excite only those magnets which are requisite at each shoot of the weft, "tracers and intermediate "plates" rest at one end on "conducting plates" connected with the terminals of the magnet coils and at the other end on a cylinder carrying the pattern, the cylinder receiving a slight rotary motion at suitable intervals; by this means the electric circuit is completed through all those magnet coils whose tracers and intermediate plates rest on a conducting part of the pattern. The pattern surface is preferred to be made of thin metal, varnish being laid over all those portions which do not form the pattern. To prevent the varnish from being injured or scraped off by the points of the tracers and intermediate plates, they are risen whenever the cylinder "makes a forward movement." The electric circuit is broken at some other point than on the pattern surface by a suitable arrangement of levers and springs, in order to prevent the pattern surface from being injured by the electric spark; the tracers are worked during the interruption of the current only.

The "small supplementary jacquard" used in most jacquard looms to effect "a certain cross action upon the warp at regular "intervals," "may either be a card jacquard or an electric "jacquard, similar to the one above described." A mechanical arrangement is described in the Specification and shown in the Drawings.

The electro-magnetic arrangement for changing the shuttles.—The extent of motion of a slide, connected to the "shuttle or "drop box" by levers and gearing, is regulated by pins, furnished with "spiral" [helical?] springs, and acted upon by electro-magnets; the slide carries tappets which encounter the projecting pins, the right shuttle box is thus brought opposite to the shuttle race and maintained there by a friction brake until a change of shuttle takes place. To bring into action suitable electro-magnets, the above-described plan of pattern surface may be used; the Drawings, however, show a "comb" of wires in the electric circuit, insulated from one another and working over a cylinder pierced with holes, in which holes are fitted metallic pins according to the pattern.

A method of applying this system to an ordinary loom.—The jacquard cylinder with its cards is removed and replaced by a wooden frame enclosing the whole of the electric apparatus; the "griff" or "lifter" of the loom acts upon this apparatus by means of a rod. The general principle of this part of the invention is the same as that of the electric jacquard apparatus already described; the electro-magnets, however, attract their armatures a slight distance and have a weak spring to remove the armatures from the magnets. In order that a very weak battery may be required, the "stages of magnets" are excited one at a time and in rapid succession.

In an improved method of constructing patterns, all the parts of the pattern representing one color are brought to and connected metallically with one of a number of strips, there being one strip to each color. One of these strips is connected as required to one battery pole and the other terminal of the circuit (the coil terminal or terminals) is in contact with the metal part of the pattern or not, as the case may be.

[Printed, 2*s*. 10*d*.]

A.D. 1856, March 22.—N° 679.

JOHNSON, John Henry (*a communication from Charles Claude Etienne Minie and Louis François Clement Breguet*).—" Improvements in electro-magnetic printing telegraphs."

In the instruments described in this Specification the transmitting and recording instruments are driven by clockwork; the completions of the circuit in the transmitting instrument being made by the depression of a finger key, and the marks in the recording instrument being made by corresponding depressions of a lever armature by a then excited electro-magnet.

A marking instrument is first described.

In the transmitting part of this apparatus finger keys (like those of a piano-forte and corresponding to the letters of the alphabet) are ranged over a revolving non-conducting cylinder, which cylinder carries metal studs so disposed under each key as to make electric connection according to the symbol to be marked at the recording station. The depression of one of the keys lowers a rod which passes under all the keys, thus setting free the clockwork to move the cylinder, and (by means of a "spring") makes electric connection with all the studs belonging to the key as the cylinder revolves.

In the recording part of the apparatus, the clockwork portion of the transmitting apparatus, belonging to the same station, moves the paper longitudinally once every revolution of the cylinder, by means of a star wheel worked by a hook on the side of the cylinder. The paper also receives a transverse motion during the transmission of a signal, by means of a "continuous helicoidal "grooved drum" on the cylinder axis, in the groove of which the paper guide works; this arrangement enables all the marks belonging to each letter to be placed in one line transversely on the paper. The lever armature of the recording electro-magnet has at its extremity a pricker, and its tail is depressed, when in the normal state, by a reaction spring. It is proposed to prick two strips of paper at once.

A type-printing apparatus is then set forth. The general principle of this apparatus is the same as that of the above-described arrangement, the following modifications are, however, necessary. "The cylinder, which is of metal instead of wood, is fitted with a "number of projecting pins arranged spirally" [helically ?] "round "its surface, each pin corresponding to a key on the manipulator, "whilst each key corresponds to a letter, number, or other character or sign. A type wheel with letters on its periphery is "substituted for the continuous helicoidal grooved drum, which "is no longer requisite, since the lateral traverse of the strip is "not wanted. The pricker is also dispensed with, the end of the "lever which carried it being merely required to press the paper "on to the letter presented by the type wheel to print the same on "the paper which passes over it. Several letters may be produced "at the same time, those letters which follow one another in the "same word in alphabetical order being produced with the same "rapidity as a single one. Also by increasing the length of the "key board, so as to allow of several alphabets sliding on it, an "entire word may be produced, whatever may be the order of the "letters, by depressing the requisite keys with both hands simultaneously."

[Printed, 11*d*.]

A.D. 1856, March 25.—N° 708.

COTTAM, GEORGE HALLEN, and COTTAM, HENRY RICHARD.—"Improvements in the manufacture of chairs, bedsteads, "and other articles to sit and recline on," consisting of:—

1st. "Connecting together and ornamenting the different parts "of the frames" of the above-mentioned articles. Instead of placing the parts to be connected or ornamented in sand or iron moulds, "and casting iron thereon," the following process is employed:—"The parts of the frame on which the ornamental or "connecting casting is to be made are cleaned, as in the usual "manner, and enclosed in a closely fitting mould of brass, of such "interior form as to produce the casting required" when the metal is poured into it; as soon as the casting is sufficiently cool it is removed from the mould, *and at once electro-coated with brass or other metal by means of a galvanic battery and suitable solutions.* In place of iron, zinc (by preference), "or other metal melting at a "lower temperature than brass," is used for the above-mentioned castings.

2nd. "A method of making the legs of bedsteads, chairs, and "other articles to sit and recline on."

3rd. "A method of constructing folding chairs, in order that "they may fold more completely and conveniently than chairs "heretofore constructed."

[Printed, 7*d.*]

A.D. 1856, March 26.—N° 718.

TOLHAUSEN, Alexandre (*a communication from Halvor Halvorson*).—"An improved mode of manufacturing porous earthen-"ware," adapted (amongst other uses) *to the manufacture of porous cells for galvanic batteries.*

This invention consists of "the employment of a volatile salt "or substance mixed with plastic clay for manufacturing porous "earthenware."

The "volatile salts or substances" that may be used are as follows:—"Oxide of mercury, arsenic acid, sulphur," and resin. The volatile body is reduced to fine powder and mixed with plastic clay, moulded to the required form, and burned in a common potter's kiln; "the act of burning drives off the volatile substance, leav-"ing the clay of a strong porous nature."

The proportions of the volatile substance and clay vary according to the use to which the porous earthenware is to be applied.

[Printed, 3*d.*]

A.D. 1856, March 27.—N° 734.

BRUNEL, Bonnet Frédéric.—" Improvements in the manu " facture of Prussian blue."

This invention "consists in adding to the ingredients usually " employed in the manufacture of prussian blue, chromic acid and " oxalic acid, in mixing the whole together in a precipitating vessel, " and in the application thereto of a current of electricity."

" Yellow ferrocyanide of potassium, protosulphate of iron, and " sulphate of alumina (salts now used in the manufacture of " prussian blue,)" are dissolved "in water in separate vessels (so " constructed as to allow of heat being applied thereto);" "when " at the desired degree of concentration" "they are poured into a " precipitating vat together with chromic acid and oxalic acid," and their action is excited "by an electric current from the two " poles of a battery led into the vat" for a certain period. " On " cutting off the electric current" the matters precipitate for a certain time, "the supernatant liquor is drawn off, and the preci- " pitate withdrawn from the vat." The precipitate (Prussian blue) is drained, pressed, and dried.

" Bichromate of potassa" may be used instead of chromic acid, and the product may be improved by the addition of "hydro- " chlorate of peroxide of manganese."

[Printed, 4d.]

A.D. 1856, March 29.—N° 755.

PULS, Francis.—" Improvements in galvanic batteries."

This invention "has for its object to effect a saving in the cost " of working galvanic batteries, and obtain an equal amount of " galvanic electricity to that produced by those at present in use." " The improvements consist "in employing, in place of the zinc " or otherwise, commonly employed for galvanic batteries, mate- " rials of a cheaper description, such as iron (cast or wrought) in " conjunction with carbon, in which case the cast or wrought " iron forms the positive pole, and black pottery or graphite, or " any other description of carbon or coal, the negative pole. " Single, double, or treble fluid batteries may be constructed on " this principle, employing the black pottery, graphite, or other " carbon, as above described, in conjunction with the usual

" exciting agents, such as diluted sulphuric acid, muriatic or " hydrochloric, or other inorganic or organic acids, or solutions " of one or more metallic salts."

[Printed, 3*d.*]

A.D. 1856, April 3.—N° 810.

GLASSFORD, John Hamilton.—(*Provisional Protection only.*)

" This invention relates to the production or preparation of " printing surfaces by the application of electrotype processes to " engraved or etched surfaces of stone, zinc, or metal, so as to " produce cylindrical plate and block-printing surfaces, suitable " for the purposes of the calico printer, and suitable for printing " textile fabrics, paper hangings, and other materials of various " kinds."

The stone or metal has an engraving (either sunk or in relief) on it, either by methods " described in the Specification filed by " the Inventor " under Letters Patent obtained by " him " on or " about " the 5th September, 1855, " or in any other mode." The engraved surface has " a metallic conducting coating " applied to it, and is then coated with copper or other metal by electro-deposition. This " electro-plate," or an electro-cast from it, may be used for printing from.

When more than one color makes up the design, a " sett-off " of that part of the design intended for the first color is taken from the stone, or metal plate, and transferred to all the plates intended to be used. Each plate has then the portion of the design for one particular color drawn on it and etched. " Electro-plates " are then obtained, one for each color, and the whole design can be printed in colors from them in the usual manner.

The " electro-plate coating " is adapted to cylinder printing by fixing it round a roller and uniting the edges " by galvanic sol- " dering or other well known means."

The surface of a lithographic stone may be protected by an electro-coat " so thin as not to injure the sharp edges of the design " on the side to be printed from."

[Printed, 3*d.*]

A.D. 1856, April 12.—N° 876.

NEWALL, Robert Stirling.—"Improvements in telegraphic " insulators."

In one instance described and shown, the bell has a vertical perforation to admit a bolt; over the top of the bell and bolt, a cap is put by means of a bayonet joint. The screw of the bolt has a diametral slot in which the electric telegraph line wire is placed; a nut screws the wire up tight so as to fix it firmly. The bolt and the inside of the bell are enamelled. "A wood screw" is cast into the arm of the bell for screwing into the post.

In a second form of insulator described and shown, the top of the bell has a screw, slot, and nut as above described for holding the wire. The bolt "is fastened into a cross piece, fixed to the "pole in the usual manner."

[Printed, 6d.]

A.D. 1856, April 22.—N° 957.

SYMONS, ALEXANDER, and BURGESS, EDWARD.—"Improvements in instruments for ascertaining and indicating heat, "and also in the parts for making and breaking contact in "electric circuits used therewith."

In a contact-making apparatus, an insulated compound metal strip (suitably bent and in contact with a "metal cylinder" sliding in a metal socket) makes contact with a terminal of the battery and alarum circuit whenever it is exposed to a certain degree of temperature, as it then expands and its free end moves over the circuit terminal, carrying the metal cylinder (connected to the other terminal of the battery and alarum circuit) with it, thus completing the circuit and actuating the alarum. The chief points in this arrangement are:—That the compound metal strip consists of two strips soldered together, the combination used being gold and steel, or gold and zinc; and that the contact-making point rubs over a piece of roughened agate or glass before coming into contact with the above-mentioned terminal.

In another contact-making apparatus, the strip is included in the circuit, and the end of the strip has "a rest piece" as well as a contact piece to enable the contact piece to pass over a groove, and there to leave any dirt it may have contracted before arriving at the insulated terminal.

An indicating instrument, having the above-described arrangement for making contact, is described and shown. Motion is communicated from the free end of the insulated compound me-

tallic strip to a hand moving over a graduated arc, by means of suitably placed rods and levers. A pall working into a ratchet wheel on the pointer axis prevents the return of the hand, although the temperature should decrease, thus showing the heat at which the alarum was sounded.

A bell alarum apparatus in which clockwork is released without the intervention of electricity, but by the direct action of the expansion of the compound metal strip, is also described and shown.

Various methods of effecting contacts in electric circuits by the action of heat in softening gutta-percha-covered wires are described and shown.

In one instance, a strong spring, carrying a knife edge, completes the circuit by cutting through the gutta percha at the time of the elevation of temperature; "the gutta percha should be "coated with emery where the knife edge" "touches, in order "that on passing through the gutta percha that edge may be "clean, and suited to effect contact."

In a second instance, gutta-percha-covered wires, connected with opposite battery poles, are pressed together on the occurrence of undue heat, by a broad pressing surface.

In a third instance two springs "oppose each other, and nip "between their end a wire coated with gutta percha."

In another method of making contact by the effect of heat in softening gutta percha, a spring, that would otherwise complete the circuit, is restrained from so doing by a strip of gutta percha on being subject to undue heat the gutta percha gives way, and the spring completes the circuit.

The above-described contact-making arrangements may be placed "at distances apart, and in positions to act readily, and "give warning of any undue or excessive heat."

[Printed, 11*d*.]

A.D. 1856, April 22.—N° 958.

SYMONS, Alexander, and BURGESS, Edward.—"Improvements in apparatus for producing alarums to indicate "burglary by means of electricity."

Methods of completing electric alarum circuits by means of doors and other hinged closures:—

The knuckle of the hinge of a door, and a fixed bolt bearing against it by means of a spring, may be made to complete the

circuit, there being a piece of agate let into such a part of the knuckle, that the circuit is broken when the door is shut. On the least opening of the door the roughened piece of agate clears the bolt, and enables it to complete the circuit on the opening of the door to a slightly greater extent.

Instead of a "contact bolt," in the above-described arrangement, the direct pressure of a spring may be used.

A vertical pin or stud, fixed to the bottom of the door, may make the requisite contact with a metal quadrant fixed to the floor at the edge nearest the door, and free otherwise, so as to act like a spring. Instead of having the stud fixed and the quadrant free to act like a spring, the quadrant may be fixed and the stud forced against it by a spring. In either arrangement there is an abrasion between the contact points, which is favourable to the perfect completion of the circuit.

In another arrangement a lever is forced against a plate with a blow, by means of a spring, when the door is opened, thus employing percussive force to ensure contact.

Other methods of completing the above-mentioned circuits:—

The unlocking of a door is made to complete the electric circuit. An insulated spring pressing upon the bolt only completes the circuit when the bolt is shot back, for, when the door is locked, the insulated spring presses on a piece of agate inlaid in the bolt; a rubbing, and therefore cleansing action on the points of contact, takes place by the constant locking and unlocking of the door.

The lifting down or opening of shutters is caused to make the desired contact. A contact pin fixed to a blade spring (the whole being placed either at the top or bottom of the window frame) makes contact with a fixed, roughened, and bent piece of steel when the shutter is removed or opened; the abrasion of the contact pin on the extremity of the spring by the rough steel clasp tends to perfect the contact. The shutter bears against a stud in the centre of the spring.

The apparatus used for shutters is applied to the "bolt of a "door lock," the bolt itself standing in the place of the shutter.

The shutter apparatus is also applied to a desk, the desk flap resting on the stud and breaking the circuit.

The floor of a room may be furnished with circuit breaks called "man-traps." These consist of loose pieces of board, imbedded

in India-rubber, placed where the burglars are likely to tread. In one arrangement contact is made by two pins inserted into a piece of India-rubber, one pin being fixed to the loose board, the other to a rigid joist; the India-rubber prevents contact under ordinary circumstances, but the pins meet when the board is trodden on; in this arrangement the action of the air on the surfaces of contact is prevented, and the surfaces thereby kept clean. An inverse modification of the shutter arrangement may be applied to this apparatus.

[Printed, 11*d.*]

A.D. 1856, April 24.—N° 987.

DOAT, VICTOR.—"An improved galvanic battery, and method "of recovering and revivifying the agents employed."

The elements composing the battery are as follows:—

"Mercury, either pure or in amalgam," in contact with a concentrated solution of iodide of potassium; and a carbon "negative "pole" in contact "with a solution of iodide of potassium "saturated with iodine."

The method of recovering the agents employed is as follows:—

1st. The iodide of potassium. The liquid is heated "in a capsule "with a receiver at top;" "the periodide of mercury formed "during the action of the battery," is "volatilized, and condensed "on the top of the receiver."

2nd. The mercury. "By treating the periodide with dissolved "caustic baryta, oxide of mercury, and iodide of barium," are formed; metallic mercury is obtained from the oxide by heat.

3rd. The iodine. The iodide of barium is heated in the presence of the oxygen produced by the decomposition of the oxide of mercury. The barium leaves the iodine free, and forms caustic baryta.

The mercury, iodide of potassium, and iodine may be recovered by the following cold process:—The mercury is precipitated from the battery solution by metallic copper; the resulting solution "is "treated with hydrated carbonate of bioxide of copper," which eliminates the iodine, and leaves, on filtering, a combination of oxide and carbonate of the protoxide of copper; by heating this last product (pulverized together with charcoal dust) in a crucible metallic copper is obtained.

If an amalgam of zinc or tin is used, the oxides of these metals are recovered by caustic baryta or carbonate of copper, and the metals themselves by heating the pulverized oxides with pounded charcoal.

[Printed, 3*d*.]

A.D. 1856, April 28.—N° 1008.

DUBOS, JEAN CHARLES BERTRAND.—(*Provisional Protection only.*) The title of this invention is, "An improved electro-"magnetic apparatus," and it relates to electro-magnetic motive-power engines.

The chief peculiarities of this invention are, that fixed electro-magnets act upon moveable electro-magnets, poles of a contrary name being opposed; and that the moveable electro-magnets pass into the fixed electro-magnets or their coils, or *vice versâ*.

A reciprocating engine is first described and shown, in which the hollow coils of the fixed horseshoe electro-magnets are prolonged so as to embrace, and thence to magnetize the moveable electro-magnets when the circuit is completed. The fixed electro-magnets are placed facing each other at the opposite ends of the framing, and have the "rods" forming the moveable electro-magnets free to move in the prolonged portions of their coils, the moveable magnets being thus in the same straight line as the legs of the fixed electro-magnets. A commutator changes the electric current from one pair of coils to the other at suitable times, and thus enables a reciprocating movement to be communicated to connecting rods that rotate a fly-wheel shaft by means of cranks.

In an oscillating engine, electro-magnets mounted on a vibrating rod, at right angles to it, are attracted to fixed electro-magnets, some being on one side of the rod, and some on the other; according to the side which is excited so is the motion of the rod, and the motion is transferred to a fly-wheel shaft by the intervention of a bell-crank lever (of which the rod forms one arm), a connecting rod and crank.

A Bunsen's battery with pulverized coke is preferred to be used to produce the electricity to actuate the above engines.

[Printed, 8*d*.]

A.D. 1856, May 3.—N° 1050.

FONTAINEMOREAU, PETER ARMAND le Comte de (*a communication from A. J. A. Dumoulin*).—" Improvements in electric " telegraphs."

This invention relates to a printing telegraph, working by the synchronous movements of clockwork at the transmitting and receiving stations respectively, the clockwork at each station serving to actuate both the transmitting and receiving apparatus at that station.

The apparatus may be described under the following heads:—

1st. The " motor or wheel-work arrangement."

Its peculiarities are, that it is wound up by electro-magnetism, has a continuous motion, and is further regulated by the resistance of the air to the rotation of a " flier " and by a fly-wheel.

In order to wind up the spiral spring of the clockwork, so that its unwinding " is compensated by each revolution of the axis," and the motive power " thus rendered constant," one of the axes of the wheel train carries an excentric, which completes the circuit of a local battery at each revolution; by this means an electro-magnet is excited each time the local circuit is completed, and acts upon the " cylinder " or barrel of the spiral spring, levers being in connection with the armature, so as to move a " pawl " or click that works in a click wheel fixed to the spring barrel each time the attraction of the armature takes place.

2nd. An " improved alphabetical key-board."

This keyboard consists of 28 keys, arranged as the keys of a pianoforte; under the keyboard, and pressed upon by the springs of the keys, an endless flexible band of platinum (having suitably placed insulated portions) moves when a key is actuated. An insulated " central wheel," having teeth that work into rectangular openings in the platinum band, gives motion to the said band, which also is stretched over two insulated end pullies. Electro-magnets, worked by the line-wire current, start the platinum bands of the transmitting and receiving instruments respectively, at the same time, by releasing a pin wheel and connecting the clockwork to the " central wheel " axis.

The action of the depression of a key is as follows:—The line-wire electro-magnet at the receiving station connects the " central wheel " axle with the clockwork, and when an insulated portion of

the platinum band at the transmitting station comes under the depressed key, it breaks the previously established line-wire current in the receiving instrument (whose band is in the same relative position as that of the transmitting instrument), and completes the local circuit of the printing apparatus. Thus, the signal whose key is depressed at the transmitting station is printed at the receiving station.

3rd. "A printing or typographical apparatus to be used at will, "and worked by a separate battery."

This apparatus performs three operations on the depression of a finger key at the transmitting station, viz., the rotation of the type wheel to bring the required signal under that part of the paper strip which is between the type hammer and the type wheel, the striking of the type by the type hammer, and the moving of the paper forward ready for the next signal.

The type wheel is mounted on a continuation of the "central "wheel" axis, and receives motion from the clockwork by its means. The type hammer is the continuation of the lever armature of a couple of horseshoe electro-magnets, excited by the printing local battery. The paper is moved forward by levers, in connection with the above-mentioned lever armature, which actuate a ratchet wheel on one of the paper rollers when the armature recedes from the electro-magnet.

The action of the printing apparatus is as follows:—When the line-wire circuit is interrupted by an insulated portion of the platinum band, the return of the levers of the line-wire electro-magnet (See 2nd head), to their normal position completes the printing circuit, and the lever armature strikes the type and moves the paper as described above.

The following arrangements and apparatus are described and shown in the Complete Specification, and the Drawings belonging thereto, but are not alluded to in the Provisional Specification:—

A substitute for the platinum-band arrangement in the above-described key board. A vertical plate carries studs (one under each key) which are respectively electrically connected to springs ranged in the circumference of a circle, and bearing on a revolving metal wheel which has an insulated portion in its circumference; the plate carrying studs and springs is instead of the platinum band, and the metal wheel with an insulated portion is instead of the "central wheel" and insulated portions of the band; the

insulated portions of the wheels at both stations are always in the same relative position, and come into contact with a similarly placed spring at the same time.

"A free escapement commutator for regulating the synchronism "of the movements." This arrangement is applied to the axis of the "central wheel," and consists of two horseshoe electro-magnets (alternately excited) with their keepers; two escapement wheels, each containing 14 pins, and one of which is on the "central wheel" axis; and an "anchor lever" or escapement pallet carrying contact points in electric connection with the coils of the electro-magnets respectively. The line-wire current excites these electro-magnets, and when this arrangement is adopted, the electro-magnet heretofore called the line-wire electro-magnet," "only operates as a relay under the influence of a circuit derived "from that of the escapement, which, being only broken" by the insulated portions of the platinum band or of the metal wheel, "maintains its keeper depressed, notwithstanding the oscillation "of the escapement, only to be raised" by the interruption of the circuit by the insulated portion, "and send forward, by means of "its keeper, the local current to the printing apparatus, or to the "alarm bell arrangement. This latter consists of the same "escapement commutator, the anchor lever of which is replaced "by a hammer acting on the two inner surfaces of a bell. This "arrangement, contrary to the simple vibration commutators, "permits, even with feeble currents, the production of up to one "hundred signs per minute."

[Printed, 1s. 8d.]

A.D. 1856, May 9.—N° 1096.

JOHNSON, EDWARD DANIEL. — "An improved mode of "mounting marine chronometers."

"The object of this invention is to neutralize any magnetic "polarity that may exist in the balance of marine chronometers."

For this purpose the chronometer is mounted "in a ring or "other suitable contrivance, to which a slow rotary motion is "given" in order to carry "the chronometer round on its own "vertical axis."

In carrying out the invention the gimbals carrying the chronometer are mounted within the above mentioned ring; the ring

rests on flanged rollers, one of which carries a spur wheel on its axis, "which gears into and drives a pinion, and an arrangement "of wheelwork similar to the movement of a watch." The spring barrel is on the axle of the driving wheel, and the wheelwork is provided with an escapement. The bearing surface of the roller on the driving-wheel axis produces motion of the ring carrying the gimbals and chronometer by friction of contact.

[Printed, 5d.]

A.D. 1856, May 15.—N° 1147.

WALKER, ROBERT, and McKENZIE, ALEXANDER.—(*Provisional Protection only.*) "Improvements in electric telegraphs."

"This invention relates to electric telegraphs, in which instru-"ments are used which receive and record the messages as a series "of dots or lines produced on a receiving surface, whether such "signs be produced on chemically prepared paper by the passage "of the current, or by a marker, actuated by an electro-magnet; "and the invention consists in the use of two or more line wires "in such electric telegraphs in continuation with a series of finger "keys, each of which finger keys is capable of making and "breaking the circuits in the two or more line wires in a suitable "manner for producing the marks which indicate a letter, figure, "or word. For this purpose, the finger keys are arranged in a "manner similar to those shown and described in the Specification "of a Patent," granted to the Patentees, "and dated June 20th, "1855" (See N° 1410, 1855).

"This invention also consists in the use, in connection with the "finger keys, of weights or springs of various degrees of strength, "which, being lifted or moved by the keys, will actuate the in-"struments with various degrees of speed, thus producing signals "of greater or less length, as may be required, on the receiving "surface."

[Printed, 3d.]

A D. 1856, June 4.—N° 1335.

BROOMAN, RICHARD ARCHIBALD (*a communication*).—"Im-"provements in plating glass to render it reflective."

"This invention is stated by the inventor to consist in plating "glass by depositing upon it certain metallic and other sub-

" stances, as herein-after named, decomposed by the action of acid " or acids, as in the galvanic battery, and in a gaseous or vapoury " form, and in reducing and fixing such metallic and other " plating agents in such gaseous form by the agency of electricity " or galvanism, or both, upon the glass, into a metallic or solid " state, whereby glass will be rendered reflective.

" The invention also consists in certain arrangements of machi- " nery for carrying it into effect."

The substances used to generate the required vapours are as follows: —" Sodium, cadmium, zinc, ethiop's martial" [Ethiop's mineral ?], "sulphuric, nitric, muriatic, and meta-gallic and boric" [boracic ?] "acids." These are placed in suitable vessels "in " sufficient quantities and strength to excite the metals to action;" other materials are mentioned as being suited for the purpose of this invention but the above-mentioned are preferred.

A "fume-depositing machine."--A "framework," "the upper " surface of which is planed true, and formed with a flange," carries certain rollers, between which a flat chamber containing the glass and connected to the gas generating apparatus is made to pass by means of the planed surface and flange. The action of the apparatus is as follows:—The cleaned glass is placed with its cleaned surface "upon a plate pierced with numerous small holes," which plate "is the top of" the before-mentioned flat chamber; the chamber with the glass is then passed between a lower roller and a band of compressible material which passes round two other rollers, motion being given to them by means of a winch and spur gear; the under surface of the glass is thus coated with the "gaseous fumes."

A " machine for applying the electric currents and for fixing the " substances upon the glass."—Standards carry an insulated " skeleton platform or frame" on which an insulated hollow chamber carrying the fume-covered glass may move; "side frames" " act as guides to the chamber," and "serve to support a cloth " for covering over the chamber and the glass while the fixing is " being performed;" a frictional electric machine and a galvanic battery are mounted near the platform; the wires from the galvanic battery are "connected to some convenient part of the hollow chamber." The action of the apparatus is as follows:—" All being " in readiness, the plate of glass, with the metallic fumes thereon, " is passed from the fume-depositing machine on to the solid top

" of the hollow chamber; in the fixing machine the wires are con-" nected with the battery," certain heated gases (generated from " a mixture of boric" [boracic?] " and sulphuric acids" by the aid of the electrical machine) are allowed to enter the hollow chamber, " and the cloth is lowered over the end frames; as " soon as the current is applied the substances will be recomposed " and fixed on the glass, and the glass will thereby be rendered " reflective." To still further aid the process, heat may be applied under the hollow chamber, but is not absolutely necessary as " the current itself may be applied alone."

If thought desirable a protecting coating may be applied over this plating, the said coating being composed of some of the following substances:—" Tar, galipot, plaster, lime, cement, whiting " mixed with glue, chalk, ochre, oil colors made up with drying " oils."

[Printed, 8*d*.]

A.D. 1856, June 20.—Nº 1452.

PITMAN, John Talbot (*a communication*).—" A new method " of using the electric current or currents for telegraphic and " other purposes."

" The invention consists:"—

1st. " In employing for telegraphic and other purposes, the " positive and negative current through electro-magnets, the " poles of which are in juxtaposition, the latter being rendered " by change of polarity alternately mutually attractive and re-" pellant;" thus enabling the local and relay magnets to be combined, or the combination to be used " simply as a relay with " considerable increase of power."

2nd. " In the modification in the use of currents resulting " from placing the ends of a curved or rectangular armature " opposite to the poles of the moveable magnet, this armature " being acted upon by the approximation of the moveable magnet " or axis, restraining the latter at the will of the operator, until " the circuit in the moveable magnet or axis is broken."

3rd. " In the employment of a current from one battery through " the coils of both magnets, in direct order, to make them re-" spectively attractive, or through one of them in inverse order, " to render them respectively repellant, the circuit of the other " battery, local or main, being, when made, oppositely directed.

" The use in this arrangement of a spring as a repelling power, " when the magnets are attached, will permit all the local bat- " teries to come in to aid the main circuit."

4th. " In the use of a breakpiece, a spring or its equivalent, to " suspend the action of one of the magnets, in order to coun- " teract or control the inductive influence in cases where a change " of polarity is required."

5th. " In using (with or without the aid of a spring,) the re- " pellant instead of the attractive power, thus working from " absolute contact."

6th. " In dispensing with the ordinary exterior battery, and " employing as a substitute the magnetism of the earth, by " placing in the earth, at the ends of the line respectively, plates " of copper and zinc, & connecting them by wires with the in- " struments." This portion of the invention is mentioned in the Provisional Specification, but not in the Complete Specification.

An instrument embodying the above improvements is described in the Specification, and shown in the Drawings; its component parts are a fixed but adjustable horseshoe electro-magnet, whose keeper is the core of a second bar electro-magnet, the core being mounted on suitable axes, and therefore free to vibrate so as either to come into contact with the poles of the horseshoe electro-magnet, or with an adjustable soft iron curved armature; springs, contact points, and binding screws, suitably disposed, enable the currents to actuate the magnets, and to convey signals by the making and breaking of the circuit, which is " in connection with " a register." In one method of working this instrument the line-wire circuit passes through the coils of the fixed as well as through those of the moveable electro-magnet, thus producing repellant poles in these magnets respectively; the moveable electro-magnet then comes into contact with the soft iron curved armature, and is kept there by induction until the line-wire circuit is broken; a local circuit excites the stationary electro-magnet, and when the line-wire current ceases, and thus permits the bar electro-magnet to become its keeper, the said bar electro-magnet leaves the curved soft iron armature, and comes into contact with the stationary electro-magnet, where it is retained by induction until the next line-wire current causes magnetic repulsion, thereby sending the requisite currents to the registering apparatus. In another method of working the instrument, the poles of the same magnets are, by the coiling, made similar; the local current

excites the stationary electro-magnet, and the line-wire current actuates the vibrating electro-magnet; by transmitting the current of either magnet in alternating directions, the opposed polarities will be alternately of the same and of opposite names, and thus the vibrating magnet will be alternately repelled and attracted, and may impart action to any machinery connected with it; "the "same result obtains if the helices should be wound in the more "ordinary method, that is to say, each having its poles unlike."

[Printed, 7*d.*]

A.D. 1856, June 28.—N° 1521.

VINCENZI, EUGENIO.—(*Provisional Protection only.*) "Im-"provements in jacquard machines."

"These improvements in jacquard machines have for their "object to facilitate the working of them, and the reading of the "patterns for such looms that are worked by means of an electric "current. They consist in cutting out by means of a metallic "point the outlines of each of the coloured spots of which the "pattern is formed, in a thin sheet of tin or other suitable metal, "fixed to a sheet of stout paper, paste or cardboard, or other "suitable material, thus isolating these outlines from each other. "On the margin of the sheet of paper are traced as many lines "as the pattern contains colours, and on the back part of the "sheet each of these lines is made to communicate with its cor-"responding colour by means of small stripes of tin, pewter, or "other metal or metals, and thereby causes the electric current to "communicate with one or more of the said lines on the margin, "so that the current will be directed to the corresponding colours "without touching the others. By placing consequently the "comb of the electric apparatus on the entire surface of the pat-"tern, those teeth only will come into effect that touch a described "colour, whereas by bringing the current in contact with other "lines on the margin, other colours of the pattern come into "action."

[Printed, 3*d.*]

A.D. 1856, July 1.—N° 1539.

HADDAN, JOHN COOPE.—"Improvements in the manufacture "of projectiles, and in firing or discharging them from cannon," relating to:—

1st. The manufacture of elongated tapered projectiles propelled by a wad fitting on their tail ends.

2nd. Improvements in machinery "for manufacturing pro-" jectiles with wings or bearing surfaces" as described in N° 2305 (1854).

3rd. The employment of an electro-magnetic arrangement by which several cannon may be fired simultaneously by percussion.

"The keeper, upon which the magnet acts, may be fixed directly " upon the hammer, or the hammer may constitute the keeper;" but it is preferred "that the keeper should be formed or fixed upon " a detent or lever, which, upon being released from the magnetic " force employed, will allow the hammer to escape or fall."

"Instead of acting upon a hammer, the magnetic force exerted " may be employed to withdraw the rough tongue or slip of metal " with which some of the more recently constructed tubes for firing " ordnance have been furnished, and by means of which with-" drawal the powder or composition is ignited. This may be " effected by the motion of the keeper on the electric current being " broken or interrupted."

Under this head, in the Provisional Specification, the Complete Specification of Letters Patent granted to the Patentee, and dated October 14th, 1854, is referred to.

[Printed, 10*d.*]

A.D. 1856, July 1.—N° 1546.

DERING, George Edward.—"Improvements in galvanic " batteries," consisting of:—

1st. The use of "certain new exciting liquids for the negative " element of those kinds of batteries in which nitric acid, or a " mixture of nitric acid and sulphuric acid, has usually been " employed to excite their negative element." For this purpose " the liquids resulting from the addition of the salts, nitrate of " potash, or nitrate of soda, or other suitable nitrates or nitrites, " to sulphuric acid," are employed. Either the crystallized salts are placed "directly in contact with the acid," "without the " addition of water, unless in quantity not exceeding one-third of " the whole;" or "a solution of the salt, in quantity not exceed-" ing one-third of the whole" is mixed with the acid.

2nd. Using, in the above mentioned batteries, "a mixture of " nitric and hydrochloric acid, either with or without the addition

" of sulphuric acid or other acids," as an exciting liquid for the negative element.

3rd. " Certain methods of employing iron of any description, " or alloys of iron and other metals, or unamalgamated zinc, as a " positive element in batteries which have their negative element " excited by nitric acid, or nitrous acid, or liquids containing " nitric acid or nitrous acid in any form." The arrangement preferred is,—carbon or cast iron, as the negative element, in contact with nitric or nitrous acid; and iron or zinc borings, turnings, or filings in contact with mixtures of salts (for instance nitrate of potash or soda), or acids with not less than 13 volumes of water in the case of mineral acids, or other liquids having little or no local action on iron or unamalgamated zinc.

4th. Forming rolled zinc or other metals for batteries thicker towards the upper part, and about the surface of the liquid, to compensate for the more rapid consumption at those parts.

5th. " Protecting the metals of galvanic batteries at and about " the surface of the liquid " by cementing sheet gutta percha to them.

[Printed, 4*d*.]

A.D. 1856, July 2.—N° 1560.

BURNETT, William Hickling.—" Improvements in elec- " tric telegraphs and in apparatuses employed therein."

These improvements may be briefly described under the following heads:—

" *Selecters*."—The object of these instruments is " to enable " the transmitting agent of a telegraph to work any one or more " of several needles, indicators, or recording instruments, that he " may desire, at a distant station or stations with one circuit."

By interposing " selecters " between the coils of the indicating " needles or pointers and the line and earth wires," a road is opened, according to the wishes of the transmitter, round the needle to be worked, or round the electro-magnets of another " selecter " (in the case of many indicators to be worked by one or two line wires only), by the first current transmitted; the next current either actuates another " selecter," or causes the selected " needle or " pointer to beat in either required direction."

The " selecter " itself admits of various modifications according to the precise work it is required to do; the two following arrange-

ments are, however, described in detail in the Complete Specification and shown in the Drawings.

In the first arrangement, permanent magnets are free to vibrate on axes between the poles of peculiarly constructed electro-magnets (hereinafter more particularly described); the deflection of the permanent magnets actuates certain non-conducting rods working against springs that make contact with metal plates mounted on "friction wheels," thus completing the necessary circuits according to the direction of deflection of the permanent magnets. In the instrument shown, there are two pairs of acting electro-magnets; a third pair is added "for supporting the magnetism of "the permanent magnets employed." When the succeeding current traverses the apparatus, the combined action of the "friction "wheels" and springs is such that the "selecter" is then left "ready for a new selection."

In the second arrangement, two indicators are worked "directly "and without using magnetic needles and their coils." Six electro-magnets are used, and they act (by means of vibrating permanent magnets, levers, cranks, non-conducting rods, spring palls, and ratchet wheels) upon the indicator axes and upon metal commutator wheels having inlaid non-conducting pieces. The non-conducting rods, spring palls, and ratchet wheels are to place the circuits properly for the action of the second current, by turning the commutator wheels into suitable positions, thus opening a new circuit for the second current, which second current acts on the indicators. In this instrument the peculiar shape and position of the electro-magnets preserves the magnetism of the permanent magnets. In order to leave the apparatus in its original position after each "beat" of the indicator, certain shafts and levers are actuated by certain non-conducting rods, and the said levers react upon the non-conducting rods and ratchet wheels actuated by the first current so as to restore their commutator wheels to their original position.

In all arrangements of "selecters," in order to enable "each "pulsation of the current" to "perform the duty intended for it, and "no more," the necessary circuits are only opened on the cessation of a current, thereby making the action of "the circuit "changing machinery" independent of the duration of the line current.

Manipulators.— These instruments "also admit of much "variety, and may be worked either with one or two handles; "or with a handle and key or keys, or with keys only, ac- "cording to the nature and order of the currents required to "be sent, and other circumstances, the general object being to "reduce and simplify the movements of the hands or fingers as "much as possible, and to increase the transmitting powers of "the telegraph."

The arrangements described in the Complete Specification and shown in the Drawings appended thereto, under the head of "mani- "pulators," all depend upon the principle of the ordinary cylindrical commutator or pole changer, having fixed springs bearing up against the circumference (or a portion of the circumference) of a cylinder consisting partly of metal and partly of a non-conductor. The details of the relative placing of the springs and metal pieces vary in each application of this kind of manipulator; as, however, these instruments were designed in order to work the above-described "selecters" with ease and rapidity from the transmitting station, a single movement of the handle or finger key and its return to zero is, in many cases, sufficient to transmit all the currents necessary to form one signal.

The first instrument described and shown in detail is to work an alphabet employed by the Patentee, in which the movements of the hand for telegraphing eight of the most useful letters are exceedingly simple. One commutator (or "handle") wheel is used, the metal portions of which are combined into two circles of two series each, four springs (connected respectively to the line-wire and battery circuits) bear upon the wheel so that the deflection of the handle in opposite directions sends opposite currents along the line at the commencement of a signal. An index plate is fixed to the commutator cylinder in order to show the transmitter the amount and number of movements that correspond to each signal. A "recording apparatus" is shown attached to this manipulator, by which the message sent is mechanically recorded at the time of manipulation; a roller on the cylinder axis actuates certain levers by means of studs or teeth on its periphery; one of the levers moves a strip of paper by means of a ratchet-wheel arrangement, and two other levers make suitable pricks or dots on the paper at such times as the current is transmitted.

The second instrument described and shown in detail is "for
" transmitting, with similar motions of the handle wheels to those
" now generally used in the double needle telegraph with two
" wires, such sets of currents as will produce, with one wire and
" selecters, similar beats of the needles to those now produced by
" such movements of the handle wheels." Two "handle wheels" are used, each containing five circles of metal portions differently arranged. The spindles on which the handles are fixed are not fixed to the wheels, but have a slight play, by which means springs connected with different battery poles are made to complete the circuit according to the direction of deflection of the handles; the springs are respectively on opposite sides of the non-conducting spindle or axis, and they make connection with the metal portions of the wheels on the movement of the handles; by this means
" when the handle or key is turned in one direction" "positive
" currents" "flow down the line," and "when turned in the
" other direction" negative currents flow down the line.

When lever finger-keys are used instead of handles and "handle
" wheels," fixed springs press up against a portion of a cylinder whose centre is at the fulcrum, and periphery at the tail of the lever.

An ordinary "commutator" may be used to reverse the direction of currents transmitted (when they are required to be so reversed), thus dispensing with a second handle-wheel or key; this commutator may be worked "by the left hand, the foot, or other-
" wise, in connection with a handle wheel or key."

Improvements in "indicators, needles, electro-magnets, &c."— To lessen the vibration of a needle or indicator, it is mounted on its centre of gravity. "To cause the indicator to remain vertical
" when not acted on by the current, and to return to that position
" after it has been so acted upon with a diminished tendency to
" vibration," the end of the needle is placed between a pair of
" minute weighted levers or springs." In the quiescent state of the needle the levers rest against a fixed stop beneath the lower end of the needle, but the slightest deflection of the needle raises one or other of the levers: on the cessation of the line-wire current the needle is brought into a vertical position by the raised lever, and its vibrations are checked by the abutment of its end against the other lever.

"A needle or indicator can be made to swing over 1, 2, 3, or

"more spaces at pleasure," by arms mounted on a separate shaft, each arm being actuated by a separate electro-magnet; the electro-magnets are placed at suitable and various distances from the axis, on which the arms are free to vibrate, and are brought into action by means of "selecters." On the deflection of an arm by an electro-magnet its tail acts on a similar projecting piece on the needle shaft, and deflects it accordingly; a "spiral" [helical?] "spring of recall," or reacting spring, brings the needle to rest against a stud, on the cessation of the current.

The improvements in electro-magnets are "applicable to indicators, alarums," the above-described "selecters," "and generally to any part of a telegraph where it is desired to cause motion by means of temporary attractions." The "improvements in simple electro-magnets consist partly in the use of a single coil in one portion of the magnet, instead of a coil on each of two legs, still retaining the other advantages of the horse-shoe form, partly in making the armature, as it were, a portion of the electro-magnet, and partly in very much reducing the diameter and increasing the length of that portion of the electro-magnet covered by the coil, or making several shorter portions of such attenuated covered cores act conjointly to form one pole." "To get a long stroke of the moveable arm" or hinged armature, several such "attenuated cores" are placed at intervals, alternating with uncoiled poles. "Double coils" are used "to form electro-magnets capable of attracting soft iron electively." In one of the said double coils the line current may circulate, and in the other a local battery current. The "double coils" may consist either of two insulated coils round the "attenuated core," or of one coil round the core and the other round the hinged armature. Means are described and shown "for bringing the current of the local battery into play only at the time that the current from the distant station is in action, so that they may form conjointly electro-magnets capable of attracting soft iron electively;" these consist in supplying the above-described electro-magnets with extra poles, one at least of which is coiled, and is excited by the line-wire current; when the line-wire current passes, the local circuit is completed, by contact points, on the attraction of a keeper by the extra poles.

[Printed, 2*s*. 9*d*.]

A.D. 1856, July 7.—N° 1588.

CHENOT, Alfred Louis Stanislas, and CHENOT, Eugène Charles Adrien.—"Improvements in sorting ores, or sepa-
" rating metals from each other, and from certain combinations
" with other substances," in which the electric or magnetic fluids may be employed.

The principles upon which this invention is founded are as follows:—

"'Sorting by successive deviations.'" When materials are let drop by gravity, instead of letting them follow the vertical line, they meet successively with currents "of any fluid (even magnetic
" fluid)," and are thereby deviated from their vertical course, and according to their density or volume, drop into basins or vessels placed for their reception; these vessels being placed under or in a suitable position to each current, so that they may receive particles of a certain description. This principle may be applied to bodies of the same volume but of different densities, or of the same density and different volumes.

"'Electro-sorting,'" or separating bodies from each other by
" electric attraction or repulsion, or by electric" [magnetic?]
" attraction and repulsion, whatever be the mode of application." An example is given of an electrified pendulum, made to oscillate by any suitable means over a table carrying the substances to be sorted, and coming into contact at every vibration with an electrified body; the body at one extremity of the arc of vibration imparting to the pendulum one kind of electricity, and that at the other extremity imparting the other kind of electricity. By this means any substances adhering to the pendulum during its progress over the table (placed vertically under the point of suspension of the pendulum), are deposited in partitions at the side, for the moment the kind of electricity is changed, the adhering particles drop off. In another instance, magnetic substances are separated from other substances by electro-magnetizing the table, so that the pendulum will only attract non-magnetic bodies.

"All combinations tending to produce an alternate or con-
" tinuous sorting of any substances" are included in the above-described principles.

The following examples of applications of these principles are described and shown:—

An electro-magnetic sorting apparatus in which a series of electro-magnets are mounted radially upon a revolving shaft, so as to

form a cylinder of magnets. The ores or substances to be sorted are spread, by means of a hopper and sieve, upon an endless travelling band, which carries the material under the drum; the excited magnets then carry the magnetic particles sufficiently far to allow them to be deposited in a separate vessel from the non-magnetic particles, which fall into a receptacle under the band. A "commuter" [commutator ?] is used with this machine, which only magnetizes that portion of the drum nearest the endless band; and the magnets are represented encased.

Another apparatus is shown, in which the electro-magnets have reciprocal rectilinear motion by means of guide rails and flanged wheels; there is a hopper or "distributor," endless band, and "commuter" also to this apparatus.

In a third machine the magnets only form a part of a drum, and the outer casing is mounted on a separate but concentric shaft.

To the above apparatus permanent magnets may be used instead of electro-magnets; the magnetic particles being detached by a brush or another magnet.

In an "electro-sorting" machine a cylinder (whose axis is slightly inclined to the plane of the endless band, and is parallel to the length of the band,) is magnetized; thus imparting polarity to projecting rings; the most magnetic particles are by this machine sorted from those less magnetic.

[Printed, 1*s*. 1*d*.]

A.D. 1856, July 10.—N° 1636.

SAXBY, Stephen Martin.—"Improvements in ascertaining "the errors of mariners' compasses."

This invention "consists in the placing of a spheric diagram "made of transparent substance upon another spheric diagram, "and in the turning of one diagram upon another, and in thus "causing the intersection of the lines which are drawn upon each, "by which it is easy to measure sides and angles of triangles."

The error of a ships' compass is obtained by comparing the true bearing or azimuth of a heavenly body (ascertained by means of the above-described "spheric" diagrams) "with the compass "bearing of the same heavenly body; the deviation is the compass "error."

The diagrams are also applicable to other similar uses.

[Printed, 9*d*.]

A.D. 1856, July 18.—N° 1697.

HAMILTON, John, junior.—"An improvement in the bending "of sheet iron for the manufacture of conical tubes," which "are "particularly applicable for" [electric?] "telegraph and other "posts."

This invention "consists of employing conical rollers, by pre-"ference of steel, of a length and diameter depending on the "length and diameter of the conical tubes. The sheet metal to "be bent is passed between conical rollers, and is bent around "one of these; and by preference such roller is supported on two "other conical rollers." "The tube is finished by driving on "hoops, and rivetting it up by hand."

[Printed, 9d.]

A.D. 1856, July 21.—N° 1723.

VERGNES, Maurice.—"Improvements in electro-galvanic "machines for producing motion by galvanic electricity."

An electro-dynamic engine is described and shown, in which two galvanometers are combined, to give rotary motion to a shaft on which the magnets are mounted at right angles to one another. The magnets used are electro-magnets within the coils, and similarly-shaped parallel plates of iron outside the coils. Two separate batteries are used, one to magnetize the electro-magnets, and the other to excite the coils. The polarity of the electro-magnets always remains the same, and a "commutative cylinder" on the shaft cuts off the current from the electro-magnets and coils at suitable intervals. A "pole changer" reverses the direction of the current through the coils at every half revolution of the magnets.

Any number of pairs of coils with their corresponding magnets may be used.

In the Provisional Specification four electro-magnets are described as being mounted in separate wooden wheels, (each pair "parallel and with contrary adjacent poles,") and four batteries are used to excite the magnets and coils; no mention is made of iron plates.

[Printed, 10d.]

A.D. 1856, July 21.—N° 1726.

STATHAM, SAMUEL, and WHITEHOUSE, EDWARD ORANGE WILDMAN.—(*Provisional Protection only.*) "An improvement in "the arrangements for or working of electric telegraphs."

This invention "consists in the employment of one insulated "wire as a return wire, common to and used simultaneously in "connection or combination with more than one electric telegraph "instrument, in lieu of the earth circuit, as at present ordinarily "employed."

[Printed, 3*d.*]

A.D. 1856, July 22.—N° 1732.

COWPER, CHARLES (*a communication from Simon Petit*).— "Improvements in lighting and extinguishing gas lights;" electricity is employed for the purpose.

The valve or cock is opened by means of electro-magnetic arrangements, and at the same moment (or immediately afterwards) "an electric spark is passed through the issuing gas, or a fine "platinum wire is ignited in the gas." "By means of a reverse "current, or a current passing through another insulated wire, "the burners may all be extinguished in a similar manner."

The following are the leading features of the various methods of carrying out this invention:—

"Lighting and extinguishing a series of gas lights simultaneously."—The apparatus at each lamp post consists of a primary coil whose core "is perforated, and forms the pipe by which "the gas enters" the lamp post column, "and passes up to the "gas burner;" the armature of this arrangement, at such times as the lamp is not lit, closes the aperture in the core, otherwise a spring keeps the armature away from the core; a secondary coil is wound round the primary, and its terminals proceed to the burner. The action of the apparatus is as follows:—Main wires proceed from a suitable battery to the various lamps, where they either excite the primary coil by direct means or through a relay and local battery; the primary coil is excited at all times that the light is extinguished, thus the armature at such times closes the access of gas to the burner; when, however, the main-wire current

ceases, the spring raises the armature, the gas is free to issue from the burner, and the secondary current then made to traverse the secondary coil ignites the issuing gas by a spark.

"Lighting and extinguishing a series of gas lights in rapid "succession."—By an arrangement of electro-magnets in connection with a vibrating permanent magnet, which deflects against stops, the whole power of the battery is concentrated upon each lamp at one time, and the current acts upon all in succession, each one completing the circuit for the next; the permanent magnets have sufficient movement to turn the cock, and a secondary current ignites the issuing gas; a reversal of the direction of the current by a commutator closes the cock by the reverse deflection of the permanent magnet, and thus extinguishes the light. Three different arrangements of electro-magnets and permanent magnets for the above purposes are described and shown, but all similar in principle; in the second arrangement the permanent magnets carry contact arms instead of contact pieces; and in the third arrangement the permanent magnet turns on the plug of the cock as an axis, thus obtaining a rotary motion, and has contact levers. Various methods of opening the cock are set forth; in one, the plug has a rectilinear or sliding motion; in a second, a spring or weight turns the cock when released by the keeper of the electro-magnet; and in a third, levers enable the elasticity of the gas to assist in opening the cock.

"Arranging a series of branch wires (each of which is provided " with apparatus for lighting and extinguishing one or more gas " lights) in connection with a commutator and a battery, or other " source of electricity, in such manner that each of such branch " wires may be placed separately and in rapid succession in con- " nection with the battery or other source of electricity by moving " the commutator."

Other details are set forth.

[Printed, 8*d*.]

A.D. 1856, July 23.—N° 1745.

ELLISON, Roger Bolam.—(*Provisional Protection only.*) " Improvements in electric telegraph apparatus," consisting of:—

1st. "The substitution of a short coil round a piece or pieces of " soft iron for the long coils usually made use of round the needle

"itself. The needle works either vertically or horizontally "between the poles of the magnet."

2nd. A "manipulator or apparatus for changing the direction "of the currents." "An oblong non-conducting trough, from "which one end is wanting," contains a non-conducting "fix "piece or tongue" "capable of moving from side to side upon "pivots;" one pivot being in the closed end of the trough, the other end of the "tongue" being "carried through an "opening in the face of the telegraphic apparatus," and carrying the handle for working the instrument. "Upon the "sides of the trough are a series of studs and springs, and upon "the sides of the tongue are a series of studs, by the joint action "of which communications are maintained or changed in their "direction between the battery and the coil as the tongue is "moved from side to side by the projecting handle."

The instrument in its passive state is fitted to receive signals by means of lever springs, which then make the requisite connections; these, however, are withdrawn from contact when the tongue is deflected, and the communication made by them is then broken.

[Printed, 3*d*.]

A.D. 1856, July 23.—N° 1751.

DETOUCHE, Constantin Louis, and HOUDIN, Jean Jacques Emile Robert, junior.—(*Provisional Protection only.*)

"Improvements in the application of clocks or timekeepers, "actuated by electricity, to street and other lamps," "for the "purpose of indicating time."

An electro-magnet, hid by the framing of the lamp, communicates motion to the clock train, in accordance with a standard clock, conducting wires being laid down connecting all the lamp clocks with the standard clock. The mechanism between the electro-magnet and the clock train consists of two soft iron bell-crank levers placed over the poles; to one arm of each of these levers is jointed a single connecting rod, which works a pall and ratchet-wheel, whose axis is in connection with the minute-hand axis, by means of a wheel and pinion.

Another improvement "refers to the arrangement of the dial, "which is placed inside the exterior glass of the lamp; the

minute wheels are confined within another curved glass interior of the lamp, which is ground, or painted, or stained, and so inclined and arranged as to allow a sufficient space at the top of the lantern for lodging the electro-magnet and other parts, its lower part nearly touching the dial. This form, and grinding or painting the glass, prevents the mechanical fittings casting a shadow on the dial."

[Printed, 3*d*.]

A.D. 1856, July 25.—N° 1775.

BAGGS, Isham.—" Improvements in apparatus for lighting, sig-" nalling, and telegraphing by means of electricity."

" The chief or principal agency by which this invention is car-" ried into effect is that of frictional or high tension electricity, " by whatsoever means produced."

The improvements consist of,—

1st. " Arrangements for the instantaneous lighting and ignition " of gas when used for purposes of illumination, and for turning " the same on and off, when desired, and for effecting the ignition " of other combustible substances."

By way of illustration, the arrangements used for street lamps are described and shown ; they are as follows :—

Main wires are laid between the lamps, either suspended in the air and insulated at the various points of support, or laid under ground, or under water, and covered throughout their length with gutta percha or other suitable non-conducting substance; " in " cases where the connecting wires are suspended openly from " lamp to lamp, it will only be necessary to insulate those por-" tions thereof which pass through the lantern," or near any metallic object in connection with the earth, and within a short distance of the said connecting wires. The wires are not continuous, but have a break of one-eighth of an incb, or so, directly over each burner. When the electric discharge takes place, a spark passes through the issuing gas (turned on by the herein-after mentioned apparatus), and ignites it. A great number of burners may be included in one circuit.

For turning the gas on and off, methods dependent upon pneumatic or hydraulic arrangements, or both, are described and shown. Although the methods so described in detail are preferred, " other

"methods, such as the employment of liquids of different densi-
"ties, the decomposition of water by means of voltaic batteries,
"electro-magnetic arrangements, or any other easily transmissible
"power, may be employed."

The gas is fired or ignited by means of a number of charged Leyden jars, so disposed as (at the moment of discharge) "to "form an electrical series" of positive surfaces alternating with negative surfaces. A handle connected to a bar brings all the jars simultaneously into a suitable position, by the action of the operator's hand, when a discharge has to be made.

2nd. "Certain arrangements and apparatus for signalling on "railways, extending to the communications between the drivers "and guards of trains; and also to signals for the purpose of "notifying the dangerous proximity of trains running on the "same line of rails."

In the arrangements for signalling between the guards and engine-drivers of railway trains, and *vice versâ*, "the connection "between the guards' boxes or vans and between them and the "engine, is effected by means of the ordinary couplings," the couplings of each carriage being connected by wires, and insulated when necessary; the conducting line is insulated as it approaches the engine and tender; the rails serve as the return circuit. The source of electricity in the guard's van is preferred to be a plate machine (driven by the carriage axle), in connection with Leyden jars arranged as in the 1st improvement, and a hydro-electric apparatus on the engine. "Detonating signals, which, "upon exploding will exhibit a colored light," are preferred, but an alarum in connection with an "electrical mortar" may be used.

In "ascertaining the proximity of different trains when travelling on the same line of rails," a rod (connected to electrically charged surfaces) is presented from the engine to an insulated wire extending along the curve or cutting protected by this means; should there be a "flash" between the rod and the wire, there is danger, but not otherwise. As the discharge also takes place to the charged surface of the train in advance, "intimation of "danger is simultaneously conveyed to the drivers of the two "trains," the charged surface on one train being positive, and on the other negative.

3rd. "Improvements in telegraphing generally; and in the apparatus used for such purposes."

In the simplest form the "telegraphing" or transmitting in-rument consists of a Leyden jar mounted on the tail of a key ver; this is kept constantly charged, and parts with its charge the line wire on the depression of the key. The receiving ap-aratus may either consist of a "receiving jar," or of "a simple conductor" placed "within 'striking' distance" of the tele-raphic wire.

In a "duplex telegraphing instrument" two charged Leyden ars are caused to revolve uniformly; the internal coating of each ar is charged with the opposite kind of electricity; and if the re-uisite finger key is depressed it discharges itself into the line wire t the next time of passing the knob or ball in connection with the said line wire, the discharge of each jar taking place alternately. For receiving the electric discharge fixed Leyden jars are used, the internal coating of each jar being charged with the opposite kind of electricity respectively. One line wire only is required for working either this or the first-described arrangement.

In a "'multiple' telegraph apparatus" several persons may "work as many different instruments," and "communicate with "as many different stations through the medium of two wires "only, without the possibility of the messages or communications "so forwarded clashing or in any way interfering with each other." One wire is called the "primary" wire and carries the "flashes" that constitute the signals when the circuit is completed by the depression of a finger key; the "flashes" that are not intended as signals are conducted away by the other wire (called the "secondary" wire), the circuit of which is always coupled up at the transmitting station. At the transmitting station the appa-ratus consists of a somewhat similar arrangement to that used in the "duplex telegraphing instrument," as many revolving Leyden jars being used as there are stations to communicate with. The arrangements at the receiving station are also somewhat similar to those of the "duplex" apparatus, but the receiving jars have their knobs adjusted at various distances from the knobs in con-nection with the "primary" wire; the secondary wire has also a receiving apparatus, with its knobs adjusted at such distances apart, as to conduct away those "flashes" that belong to other stations, and are not to be received as signals at the station in question. Each jar (at the receiving as well as at the transmit-ting station) is discharged and recharged once every revolution of the axle.

An "apparatus for transmitting telegraphic messages through a "single line of wire with very great rapidity," consists of a gutta percha band pierced with suitably placed holes; into some of these holes metal pins are inserted, according to the signals to be transmitted. The band so charged with pins is made to pass from one roller to another, so that the pins complete line-wire circuits with Leyden jars; there are two rows of pins, and each row sends electricity of an opposite name. The electric discharges at the receiving apparatus may cause perforations in a strip of paper [See N° 10,257, Old Law?].

Non-conducting gloves, boots, carpets, and table-covers may be used to protect telegraphic operators from the effects of the electric discharges; in some cases these articles may be made of metal, with a continuous conduction to the earth.

In the above-described applications of tension electricity, the line wire forms one half of the circuit, and the earth forms the return circuit, as in ordinary electric telegraph communication.

[Printed, 1*s*. 7*d*.]

A.D. 1856, July 31.—N° 1807.

TORASSA, Constantine John Baptist.—"Improvements "in obtaining motive power by the aid of explosive gases."

A mixture of hydrogen gas and air is admitted alternately on opposite sides of the piston of a cylinder and piston arrangement similar to that of an ordinary steam engine, and is exploded at the proper time by a spark, or red-hot platinum wire "obtained by a "galvanic battery;" motion is thus produced. The hydrogen may be obtained from the decomposition of water, either by means of a galvanic battery, or by passing steam through a red-hot tube containing iron scraps. This part of the invention is intended as a substitute for steam power.

"The above-described power of exploding gases" may be applied "to every description of steam engine."

The first method is by "removing the boiler, the furnace, and "the chimney," and making the requisite alterations, "particularly "in the cylinder," so "as to make it answer for using explosive "gases instead of steam."

The second method consists "in removing only the furnace and "chimney and the water from the boiler," and forcing air into the

boiler by the explosion of gases according to the method above set forth; the air, thus compressed, works the engine instead of steam. To increase the pressure, the air in the boiler may be heated.

[Printed, 9d.]

A.D. 1856, August 1.—N° 1819.

BRETT, JOHN WATKINS.—"Improvements in letter and numeral printing electric telegraphs."

In the receiving instrument a permanent magnet, mounted on an axis, oscillates between "the poles of two temporary magnets," but does not touch them. "These magnets are in the circuit of "the battery of the sending instrument, and are excited by a "succession of reverse currents to impart the number of moves "required to produce the desired effect; each change of the current "produces an oscillation of the permanent magnet, which acts on "the detent wheel of a train of wheels which have a constant tendency to revolve by means of a wound up spring or weight. "The detent disengages and allows a given amount of revolution "in the detent wheel, which then stops; the succeeding oscillation "of the permanent magnet repeats the action of the detent, and "so on."

The type wheel is placed in the above-mentioned train of wheels; it "turns round on its axis when thus actuated, and brings the "letter into the position for impressing or printing, which is "impressed or printed as will herein-after appear. The permanent "oscillating magnet is by its stops placed in the circuit of a local "battery and temporary magnet, the currents of which are rapidly "reversed during the oscillation of the permanent magnet; this "temporary electro-magnet being furnished with a soft iron armature has not time to become excited, so as to magnatise and "attract the soft armature during the time the currents are being "rapidly reversed; but when a pause takes place in the transmission of the currents, the current will continue to pass through "this magnet, it will become excited, and the soft armature will "be attracted; the effect of which is, that a second train of wheels "is detached by a detent acted on by the movement of the soft "armature, which permits one revolution of a shaft in this second "train."

A local battery circuit is made and broken twice during one revolution of the shaft. One of the circuits prints the letter by

means of a powerful electro-magnet; the paper is fed by the retrograde movement of the pressing surface. The other circuit, by its completion, causes an electro-magnet to throw the type wheel out of gear with the wheel train; the said type wheel then runs back to zero.

"The sending instrument consists of a dial, having the letters "and figures marked in the same order as the type wheel of the "receiving instrument. A pointer is turned to the letter on the "dial it is desired to transmit, and brought back again to a definite and fixed stop. At every letter that the pointer passes on "the dial, in thus returning to the stop, the direction of the "current transmitted to the receiving instrument is reversed." "When the pointer arrives at the stop on the dial of the sending "instrument a pause in the changing or reversing of the currents "takes place. The type wheel having brought the letter or figure "into position to be printed, this pause has the effect of impressing "or printing the letter so presented, as before mentioned."

"The end of the axis of the type wheel may or may not be "furnished with a hand or pointer to indicate upon a dial the "letters being printed, and by disconnecting the wire from the "local printing magnet, can be used as an indicator to read by "means of the hand; the hand and axis of the type wheel *return* "to zero, as before mentioned."

In using this instrument for long distances, a local battery is made to work the receiving instrument by means of a relay consisting of a permanent magnet oscillating between the poles of two electro-magnets; the said electro-magnets being excited by the line-wire current.

A type wheel for "minerals" [numerals?] as well as one for letters may be used.

[Printed, 2*s*.]

A.D. 1856, August 8.—N° 1868.

WOODMAN, John.—"An improved telegraph insulator."

This invention is the same as N° 335 (1856).

[Printed, 5*d*.]

A.D. 1856, August 11.—N° 1884.

FONTAINEMOREAU, Peter Armand le Comte de (*a communication*).—"A new electro-motive engine."

The general principle on which this invention is based is as follows:—A number of electro-magnets are fixed so that their poles are in one horizontal plane, and have opposite to them a series of vertical rods which carry keepers at their lower ends; the upper ends of the rods have knobs free to slide vertically in horizontal arms to which the arrangement communicates motion when the electro-magnets are excited. The rods are arranged in sets of progressively decreasing lengths; the difference of length between each neighbouring set is equal to the distance through which the electro-magnets can act effectively; each set of rods are attached to one keeper. When the electro-magnets are excited, the nearest keeper is attracted, and brings the next nearest keeper within the attraction of the electro-magnets; this keeper is attracted and brings its neighbour into a similar position in relation to the electro-magnets, and so on, until all the electro-magnets have attracted their keepers. By this means, the attraction of the keepers towards the electro-magnets in succession gives a length of stroke to the horizontal arms equal to the distance through which the electro-magnets act multiplied by the number of keepers employed.

In a beam engine upon the above-described principle, one set or plane of electro-magnets is mounted at each end of the beam, and, by being alternately excited, produce a vibrating motion of the beam.

The magnets may be separate, or they may all be fixed "on a "disc of soft iron," one half of the disc acting as a north pole, the other half as a south pole.

In one modification the armatures partly overlap each other.

[Printed, 10*d.*]

A.D. 1856, August 11.—N° 1886.

SYMONS, Alexander, and BURGESS, Edward.—(*Provisional Protection only.*) "Improvements in noctuarys or tell-"tales for ascertaining the fidelity of watchmen and for other "purposes, and in the application of electricity to such appa-"ratus."

In the improved noctuary a new means of noting or marking the time of performance of the required duty is employed. A clock, or other suitable going train, imparts uniform motion to a strip of

paper by means of a drum; on the pressure of a knob, or otherwise, a pencil marks the paper in accordance with the time at which the pressure is given; the length of time that the rod is depressed is indicated by the length of the mark on the paper.

Instead of merely using a knob, rod, or wire, an electro-magnet whose armature carries the pencil may be employed; the pencil making the mark on the completion of the electric circuit in which the magnet coil is included. By this means the watchman may actuate the pencil from a distance.

[Printed, 3*d.*]

A.D. 1856, August 12.—N° 1888.

MAILLARD, NICHOLAS DORAN.—"An improved mechanical "and magnetic compass."

A compass bowl contains "an ordinary magnetic compass "needle," "mounted on a pivot in the bottom of the compass "bowl in the ordinary way;" it also contains "a second or "supplementary needle," mounted on a vertical shaft immediately above the compass needle, so as to work parallel with it. The upper needle shaft has a cog wheel "staked on" it, by which it communicates motion to a pointer on a vertical dial, thus showing its own position, which corresponds to that of the lower needle.

The lower needle has considerably greater directive magnetic force than the upper, and the south pole of the upper needle is over the north pole of the lower needle; this arrangement prevents the compass from being "so readily affected by local attraction."

The following arrangements and modifications are mentioned:— The upper needle need not be magnetized. The lower needle may be dispensed with by giving the upper needle "sufficient "magnetic power to actuate the pointer of the index dial." The index dial may either be placed vertically or horizontally on the top of the compass bowl; or it may be placed on deck when the compass bowl is below, either by elongating the vertical shaft, "or by means of a strap and friction pulleys."

[Printed, 8*d.*]

A.D. 1856, August 19.—N° 1933.

OSMAN, HENRY FORFAR (*a communication*).—"An improved "electric clock."

This invention consists of "the combination of the several parts "of the mechanism" herein-after described; the mechanism being so arranged that the seconds' wheel is moved by the direct action of the lever armature of the electro-magnet, and "is made directly "and indirectly to drive and govern the other wheels."

The distinct arrangements set forth are as follows:—

The armature has a suitable lever and catch, which works into the seconds' wheel (containing 60 teeth), and moves it one tooth each time the electric current is closed; on the ceasing of the electric current, a "spiral" [helical?] reaction spring takes the armature from the magnet, and engages the catch in another tooth of the seconds' wheel, so that it may move the seconds' hand suitably when the electric circuit is again completed.

To restore "to the pendulum the power or strength lost in its "oscillations," a lower bent arm, attached to the armature lever, carries a suspended weight, which is lowered on to the head of a screw (fixed on an extended arm from the pendulum) each time the circuit is completed.

The circuit is completed at every second vibration of the pendulum, by the contact of a platinum pin on the pendulum with a fixed platinum pin.

The minute wheel is worked from the seconds' wheel by means of an intermediate pinion and wheel. The hour wheel is "a sim- "ple slur" [star?] "wheel," which is moved once every hour: a pin on the minute wheel for that purpose lifting a two-armed lever —"the lower arm, drawn by the pin, brings the upper arm in con- "tact with" the hour wheel.

[Printed, 7*d.*]

A.D. 1856, September 5.—N° 2069.

REEDER, RALPH.—"An improved universal dial and chrono- "meter compass."

This instrument, amongst other uses, can be employed to determine "any variations in the magnetic needle;" for some purposes the magnetic needle may be dispensed with.

The general features of the instrument, so far as they can relate to correcting variations of the magnetic needle, are as follows:—

A gnomon "revolves once in twenty-four hours by means of a "chronometer, and when the instrument is levelled and elevated "to true latitude, and adjusted at the meridian, the gnomon points

" steadily to the sun, which it follows in its course, and conversely, " if the instrument be levelled and elevated to the latitude of the " place, and turned around horizontally until the gnomon points " to the sun, it will be adjusted to the meridian, and a horizontal " angle laid off therefrom."

The chronometer, gnomon, and requisite circles are supported in gimbals, and carried by a stand, in the lower part of which a mariner's compass is fixed so as to be under the chronometer, &c.

The dial of the chronometer "is divided into twice twelve hours, " the twelve o'clocks being on the same plane as the north and " south points of the compass box."

[Printed, 7*d*.]

A.D. 1856, September 8.—N° 2093.

HERRING, FRANCIS MITCHELL.—" Improvements in applying " magnetic action to combs and brushes."

The object of this invention is "so to charge a comb or brush " with magnetic power that the comb or brush may be capable of " transmitting the magnetic action to the skin of men or animals, " thus communicating the beneficial effects produced by the action " of the magnetic power or fluid."

At the back of the brush, within a hollow made in the wood, a horseshoe permanent magnet is fixed. The polarity of the magnet is transmitted by means of two suitably placed iron plates (each in contact with a pole of the magnet) to two sets of "metallic wires" or bristles mounted on the front of the brush. These sets of wires may be either surrounded on the outside by a border of ordinary bristles or not.

The magnetic comb may either be made "of soft steel (or " other appropriate metal)" with a bar magnet enclosed at the back, or of soft steel, and afterwards hardened and magnetized, " so that one portion of the teeth shall form the north, and the " other the south pole." In "another form of comb, cut out " of soft steel, hardened and magnetized," the handle has one polarity, and the comb end the opposite polarity.

[Printed, 6*d*.]

A.D. 1856, September 10.—N° 2107.

SIEMENS, CHARLES WILLIAM (*a communication*).—(*Provisional Protection only*.) " Improvements in electric telegraphs and appa- " ratus."

Relays.—These instruments are constructed so that the second circuit is closed by an electric current in one direction, and opened by a current in the opposite direction; the relay still retains its position on the electric current ceasing, "so that a momentary electric current "in the first circuit produces a permanent closing "or opening of the second circuit." This object is effected "by "placing the pole or poles of a moveable electro-magnet between "the opposite poles of two permanently magnetic steel or electro-"magnets." The iron of the moveable electro-magnet being nearer to one pole of the fixed magnets than to the other, when a momentary electric current is passed through the first circuit in the proper direction, the moveable electro-magnet is repelled by the nearest pole of the fixed magnets, and attracted by the farthest pole; thus permanently reversing its position, until the momentary passage of the electric current in the first circuit in the opposite direction again permanently alters it. The iron of the moveable electro-magnet is caused "to revolve within a fixed coil." In lieu of the above-described arrangement one fixed magnet "may be "employed in conjunction with a spring or weight."

Induction apparatus.—This apparatus may be used to produce the above-mentioned "momentary currents;" it sends alternate "currents in opposite directions," and "is capable of transmitting "signals simultaneously in both directions through the same line "wire." In the arrangement described, secondary currents are induced "in a coil of wire on an electro-magnet, the primary coil "of which is traversed by a current from a local battery. One "pole of the local battery is connected to one end of the primary "coils of two electro-magnets. The other ends of these coils are "connected to one contact piece placed near a moveable key, "which is permanently connected to the other pole of the local "battery; by depressing the key a current is passed through the "primary coils of both electro-magnets. A secondary or induced "current is thus produced in the secondary coils of the electro-"magnets. The secondary coil of the first electro-magnet is con-"nected at one end through the coil of the relay to the line wire "and at the other end to the earth. The two ends of the "secondary coil of the second electro-magnet are connected to "the two ends of another coil on the relay, and the parts are so "arranged that the current traversing this coil may be of equal "power, and in the opposite direction to that traversing the first

" coil of the relay." "When the key is depressed at one station, " the relay at that station is not affected, but a momentary current " passes along the line wire and works the relay at the distant " station, and thus communicates a signal. When the key is " again allowed to rise, a reverse current passes through the line " wire and causes the relay to return to its first position. When " the key remains up it comes in contact with a contact piece " which is in communication with the earth, and the instrument " is then adapted for receiving signals from the distant station. " If the keys at both stations are simultaneously depressed, the " two currents in the line wire meet and neutralize each other, and " the instruments at both stations are worked by the secondary " currents of their respective second electro-magnets."

A step-by-step telegraph instrument.—The above-described arrangement of the magnets of relays works a ratchet wheel on the index axis by means of a click lever.

A magneto-electric machine.—The armature consists of a cylindrical bar of iron, having a coil wound round it in two "longitu- " dinal grooves in two opposite sides of the bar," and consequently parallel to the axis of the bar; the armature revolves between the poles of permanent magnets, "and at each revolution two " successive electrical currents are produced in its coil in one " direction, and then two in the contrary direction. The effect " may therefore be considered as equivalent to one current in each " direction at each revolution." By means of suitable wheelwork this machine may be applied to work the above-described step-by-step telegraph instrument; or it may be employed for working relays or for other purposes, suitable mechanical arrangements being used.

[Printed, 3*d*.]

A.D. 1856, September 11.—N° 2124.

BALESTRINI, Pier Alberto.—" Improvements in protecting " and laying telegraphic wires."

Protecting the wires.—"The telegraphic wires are insulated by " gutta percha or vulcanized india-rubber, or they are enclosed in " cords of hemp or other fibre rendered waterproof by a mixture " of india-rubber and pitch. The wires, thus protected, form the " core of the telegraphic cable; they are either laid parallel to each

"other, or they are laid spirally" [helically?] "on a core of fibre "or of iron wire covered with fibre. Eight or other number of "cords of hemp or other fibre waterproofed with the composition "before mentioned, are then closely wound in a spiral" [helical?] "direction round this core, and the cable so formed is consoli-"dated by passing it between grooved rollers. If the cable is in-"tended for use under a considerable depth of water, it is strength-"ened by coiling round it (in the opposite direction to the coils of "the cords) iron wires in long open spirals" [helices?], "and over "these wires the cable is wound round closely with galvanized iron "wire, and by the action of the galvanized wire on the non-"galvanized wire a calcareous deposit is produced round the cable "after it has been immersed for some time, by which it is much "protected." For a similar purpose, strips of zinc may be laid longitudinally under the wire coating. To protect the cable from rocks, it has, at those places, "steel wire wound round it." To protect suspended telegraph wires, "they are enclosed in cords of "hemp or other fibre, waterproofed with the composition before "mentioned, and afterwards painted with zinc white."

Facilitating the laying of the cable.—A kind of parachute is attached to the cable at intervals, "which parachute is so arranged, "that when the cable enters the water" the parachute opens, and by its resistance to the water prevents the cable from descending too rapidly. In certain cases floats may be used, which are soon released by the aqueous solution of their means of attachment to the cable.

[Printed, 7*d.*]

A.D. 1856, September 15.—N° 2156.

KLINE, Calvin.—This invention is entitled "The improvement "of mariners' and other compasses, by which the effect of local "attraction is cut off or neutralized, and the compass is made to "traverse more perfectly."

This improvement consists in surrounding the compass needle with a horizontal iron or steel ring or rings fixed to the non-conducting compass card and moving therewith, but "insulated" from the needle; it is preferred that "the needle should be about the "centre of the breadth of the ring to have the best effect." It is proposed "as a modification of this device, and for more

" perfect security, to have a thin disc or convex plate above the " magnet and another below attached to the insulated ring or " rings or even a globe of metal surrounding the needle." It is preferred to use soft iron to neutralize the local attraction, but " other metals may be employed with good effect." The Patentee has " used zinc and copper."

In the Complete Specification, but not in the Provisional Specification, it is stated that the point upon which the compass traverses may be made of iridium.

[Printed, 5*d.*]

A.D. 1856, September 19.—N° 2205.

HEES, Richard Van (*a communication from Raymond Kammerer*).—(*Provisional Protection only.*) " Improvements in the " construction of electric clocks or timekeepers."

This invention is the same as N° 45 (1856).

[Printed 3*d.*]

A.D. 1856, October 1.—N° 2290.

FONTAINEMOREAU, Peter Armand, le Comte de (*a communication from Professor Francesco Selmi*).—" An improved " voltaic battery."

A battery is described consisting of copper, sulphate of potash solution, and rolled unamalgamated zinc.

The peculiarities in this invention are, that sulphate of potash or other analogous salt " oxidates the zinc and causes a white pre- " cipitate, which remains mixed with the liquid," and that the copper plate is not wholly immersed in liquid, but is " in contact " simultaneously with the air, the exciting solution, and the zinc " element" [of the next cell?], " the latter remaining immersed " in the solution."

The above-described battery is "of great constancy."

[Printed, 4*d.*]

A.D. 1856, October 11.—N° 2390.

SCHEURMANN, Gustav.—" Improvements in printing music " when type is employed," in which electric agency may be used.

This invention " has for its object so to construct type with the " notes and musical signs thereon for the printing of music, and

" also so to combine lines and spaces as to admit of a page of " music being set up in two 'forms' (in separate chases), one con- " sisting of suitably formed type with the notes and signs thereon, " and the other consisting of full-length lines, separated by move- " able spaces in such manner that the same lines or rules may be " used with different spaces, the impressions being taken in suc- " cession from the two 'forms,' the proper register of the lines, " notes, and signs being obtained by the two chases being fixed " on a sliding bed or table of a printing machine."

" In order to obtain an electrotype plate from two 'forms,' such " as are above described, a sheet of lead (in place of paper) is by " a suitable press pressed on to the 'forms' in succession, by " which the combined composition will be obtained in reverse. " The lead impression thus produced is then subjected to the elec- " trotype process, and a copper plate is obtained, from which (it " being properly fixed on a surface) a sheet of music may be ob- " tained by one process of printing; or such electrotype plates " may when desired be bent over and fixed on a cylinder to be " printed from." Instead of an electrotype a stereotype mould may be got from the lead impression.

As " it is important that the type of the one form should pene- " trate exactly to the same extent into the lead as the type of the " other 'form,'" it is preferred " to employ a screw press, which " moves the platten or pressing surface very slowly." A galvano- meter may be employed to indicate when the platten has moved up to the proper point; electric contact being then made and the needle deflected.

[Printed, 11*d*.]

A.D. 1856, October 17.—N° 2438.

FRANCE, James Robert.—" Improvements in electric tele- " graph apparatus."

This invention consists " in suspending the tongues or arma- " tures of electro-magnets by means of magnetism, and in remov- " ing the tongues or armatures from electro-magnets by means of " permanent magnets in place of by springs, as heretofore;" also in " magnetically" insulating the " cap" or pole pieces of electro- magnets, by which means " the residual magnetism is reduced."

A " contact maker" in which the above-mentioned improvements are used is described and shown. A local circuit is completed each

time the electro-magnet is excited by the line-wire current, by means of a soft iron armature.

"Another contact maker, in which a magnetic tongue is used in " place of a soft iron armature" is also described and shown. In this instrument "each reversal of the line current makes or breaks " the local circuit."

This invention "also consists in a method of arranging instru- " ments or contact makers for working branch lines. For this " purpose, two magnetic armatures are used to work with an " electro-magnet, and the poles of the magnetic armatures are " placed in reverse positions, so that when one armature is attracted " by the electro-magnet the other armature remains stationary " against its stop; thus, when the current in the line wire passes " in one direction the instrument works one branch line, and when " the current in the line wire passes in the other direction the in- " strument works the other branch line."

An instrument employed "in connection with a printing appa- " ratus" has "a magnetic tongue" as well as "two magnetic " armatures;" the "tongue" works between the electro-magnets' poles, and the armatures are placed one on each side of the poles as in the branch-line contact maker. "The magnetic tongue at " each of its motions makes or breaks a circuit, and causes a type " wheel to make one step forward." "When the type wheel is " brought to the desired position, the force of the current passing " in the line wire is augmented, so as to cause one or other of the " magnetic armatures to be drawn towards the electro-magnet, and " thus another local circuit is completed," which actuates the " printing hammer." The movement of either armature produces this effect; "but it is necessary to use two magnetic armatures, " because the augmented current passed through" [round?] "the " electro-magnet must not be of such a nature as to cause the " type wheel to make another step."

[Printed, 7d.]

A.D. 1856, October 20.—N° 2456.

LACASSAGNE, Joseph, and THIERS, Rodolphe.—"An im- " proved electric lamp."

In this invention the lower electrode is supported by a float " placed in a cistern of mercury, which has a rise equal to the

" travese" [traverse?] required for the electrode; "a second " cistern or reservoir containing a supply of mercury is placed at " a higher level." The communication between the upper cistern and the float cistern is ordinarily closed by the pressure of the armature of an electro-magnet on a valve, the electro-magnet's coil being included in the electric circuit producing the light. When the force of the electric current has weakened by the combustion of the electrodes, a reaction spring or a second electro-magnet detaches the armature from the valve, and permits more mercury to enter the float cistern, and to raise the lower electrode to the proper distance; the first-mentioned electro-magnet then again attracts its armature and closes the valve. This action is repeated whenever the electrodes become too far apart, thus keeping the distance between the electrodes constant by self-acting means.

The second electro-magnet is excited by "the action of a " current derived from the light current." The intensity of the derived current is determined by the invariable resistance of a coil interposed for that purpose; thus it will be seen that the derived current increases as the principal current diminishes, and *vice versâ*. In the Provisional Specification no mention is made of the derived current, a spring being therein proposed to be used to raise the armature.

[Printed, 7*d.*]

A.D. 1856, October 21.—N° 2470.

SMITH, WILLIAM (*a communication*).—" Improvements in water " level and pressure indicators and lubricators."

In this invention, amongst other improvements, a permanent magnet within the apparatus is actuated by a float or other suitable means; the magnet "in turn operates and controls the " movement of the hand pointer or indicator, so that the latter " corresponds in its positions with that of the magnet, and " relatively through the magnet to that of the float moved by the " water or other operating fluid."

The arrangements of pointers or indicators are as follows:—

An axis or spindle carries a float arm at one end and a bar magnet (or "magnetised fork-piece") at the other; according as the float at the end of the arm is risen or depressed, the bar

magnet acts by its rotary or vibratory motion on the pointer, which is delicately and concentrically mounted outside the gauge chamber, thus showing the level of water or other required indication.

An arrangement "for indicating pressure upon a vertical re- gister or on a dial scale."—The float is guided by a central upright rod passing through it, and "has belted around it the "magnet." Outside the apparatus, and delicately mounted on a centre, are a spiral and needle pointer; as the magnet moves, it brings the part of the spiral of the same distance from the centre of motion as the magnet is, opposite to the poles, and thus at the same time rotates the needle pointer, and indicates the pressure on a vertical scale.

The magnet may be also worked vertically, "by applying the "pressure to raise a vessel containing a dense fluid from immer- "sion in a fluid of the same or less specific gravity." This principle can also be applied to a rotary magnet by means of a cord fixed to the vessel passing round a wheel on the magnet's axis, or by a rack and pinion movement.

[Printed, 11*d*.]

A.D. 1856, October 23.—N° 2483.

HARRISON, Charles Weightman.—(*Provisional Protection only.*) "Improvements in the insulation and protection of electric "conductors."

This invention "consists in insulating the conducting medium "by covering it with alternate layers of gutta percha, or a com- "pound thereof, and a fibrous material." "The conducting "medium, when covered with gutta percha strips or ribbons," may be made plastic by heat, and whilst in that state the convo- lutions may be compressed together. "When a number of con- "ductors are required together, as in some telegraph cables," a bundle of separately covered conductors is enclosed in a gutta percha tube.

Another mode of insulation "is by laying or winding" around the conductor "seperate coverings of gutta percha and caoutchouc, "cloth, or felt, and causing the successive layers to unite" by heat and compression.

A conductor for induction coils may be insulated by winding a smaller conductor "spirally" [helically?] "around it, one or both

"of the conductors being covered with a fibrous or insulating "material."

Underground telegraphic conductors for hot climates may be insulated and protected by means of a fibrous covering enclosed in a tube or wrapper of lead; the fibrous covering may be either combined or not with a gum.

The protection to electric cables may be increased "by passing "such rope or cable through a composition of tar and cement, or "lime, or other mixture, which will fill the interstices between the "outer wires, and set or form a concrete when the rope or cable is "laid down."

[Printed, 3*d*.]

A.D. 1856, October 25.—N° 2507.

ERNST, Gustavus, and LORBERG, William.—(*Provisional Protection only*.) "An improved mode or method of raising or "producing designs, patterns, or impressions on the surfaces of "plates, blocks, or rollers, and transferring or imparting the same "to paper, parchment, woven fabrics, leather or other similar "materials;" *in which electro-etching is used.*

"In making original drawings, or producing any original design "or matter," they are executed directly "either on a metal plate or "on transfer paper with chalk or lithographic ink;" the composition of each of these being adapted to this invention. "If copies "only are required," they are transferred with the transfer ink to the metal plate; the plate is then cleansed by means of alkali or acid, protected at the back by varnish and electro-etched; by this process the design is left in relief on the surface of the plate.

It is proposed by the above-described means to supersede copper-plate, and lithographic printing; the plates or blocks being made "the same thickness as the fount or type."

"By multiplying the number of plates or blocks any number of "different colours may be used in printing the designs or patterns."

To dispense with stereotyping, a copy of the work to be preserved is taken on the transfer paper; a metal copy can be produced from it at any time when desired.

Blocks or rollers for printing woven fabrics may be produced by the above-described process; either raised or sunk designs can be obtained.

[Printed, 3*d*.]

A.D. 1856, October 29.—N° 2540.

JOHN, THOMAS.—This invention is entitled "A new electric "telegraph apparatus for writing;" it, however, relates to a telegraphic signal-receiving apparatus in which the signs are dots and lines marked on paper by a color roller or disc.

Motion is given to the paper "by any of the well-known "methods;" the paper is guided by suitable rollers, so that it passes over a "sharp metallic corner" opposite to the color roller, moving a roller which rotates the color roller (by pullies and band), on its way to the point of impression. The color roller rotates in a color trough, and is mounted on the end of a bent lever in connection with the lever armature of the receiving electro-magnet.

Whenever the lever armature is actuated by the electro-magnet, the color roller comes into contact with the moving paper, making a longer or shorter mark according to the time of action of the electro-magnet and the speed of the paper.

[Printed, 8d.]

A.D. 1856, October 29.—N° 2547.

WAY, JOHN THOMAS.—"Improvements in obtaining light by "electricity."

"This invention consists in the use for one of the electrodes of "a substance such as mercury, which is caused to flow through "an orifice or orifices on to a point or points of steel or other "material.

"The mercury is in connection with one of the poles of the "battery, and the points are in connection with the other pole of "the battery, and they are so arranged that the distance between "them and the orifices from which the mercury escapes can be "adjusted so as to bring the points to the level at which the "streams of mercury break into drops.

"In place of using points of steel or other material for the "lower electrode, a regulated surface of mercury may be employed "if desired, and the apparatus may be surrounded by a glass to "prevent the escape of mercurial fumes, means also may be pro- "vided for raising the mercury from the lower receiver, into "which it falls, from the orifices, to the upper receiver or cistern "which supplies the jets."

[Printed, 8d.]

A.D. 1856, November 10.—N° 2646.

JOHNSON, JOHN HENRY (*a communication from Louis Francois Clement Bregnet [Breguet?]*). — (*Provisional Protection only.*) " Improvements in apparatus for printing electro-telegraphic " dispatches."

This invention relates to an arrangement of printing apparatus more particularly applicable to step-by-step dial instruments.

" On the arbor of the escapement wheel of the clockwork for " working the dial indicating mechanism is fitted a type wheel " having its letters and signs raised upon its periphery." The line-wire electric current excites magnets for the dial mechanism, which, when sufficiently magnetized, complete the local circuit working the printing mechanism. When the indicator or pointer is passed rapidly over the dial plate merely in order to arrive at a certain signal, only the dial mechanism acts, as the electro-magnet has not time to be completely excited; but when the dial indicator stops over a signal, the electro-magnet is fully excited and the printing mechanism set in motion by the local circuit. On the armature of the dial magnets are two springs, which establish the local circuit when required; one of the springs comes against a stop in the local circuit each time the indicator passes in front of a letter; the second spring cannot come against its stop so as to complete the local circuit until the indicator is stopped, and thus sufficient time afforded to completely magnetize the electro-magnet.

In the local circuit, two electro-magnets or coils work a lever which presses the paper on to the periphery of the type wheel. A " catch " on this lever turns a "feed wheel," thus moving the paper forward. The printing coils are larger than the indicating coils, and thus " require a longer time to become excited."

[Printed, 3*d*.]

A.D. 1856, November 14.—N° 2692.

ASH, HENRY CLARKE.—(*Provisional Protection only.*) " Improvements in railway signals."

"This invention consists in a method of applying electricity to " act on railway signals placed at a distance from the person by " whom the signal is to be operated on, such signals being " of such a nature as to come in contact with instruments in con- " nection with the passing train, and so give an alarm thereon."

"For this purpose, at a distance, say, of two miles from each "signal man, a signal apparatus is placed by the side of the line "of rails, or in other convenient position; and from the signal "man to the apparatus at a distance a telegraphic wire passes, and "within the signal box the telegraphic wire is in connection with "an electro-magnet or other suitable instrument, which, when "brought into action by the electric current, withdraws a detent, "or otherwise liberates the signal, and brings it into such a posi- "tion that it comes in contact with a trigger in connection with "the passing train, and, by preference, with the engine of the "same, and thus an alarm on the train is brought into action, and "timely notice is given to the engine driver of the danger before "him."

[Printed, 3*d*.]

A.D. 1856, November 20.—N° 2747.

FONROBERT, CHARLES FRANÇOIS JULES (*partly a communication*).—(*Provisional Protection only.*) "Improvements in the "manufacture of insulated wires for electric telegraphs."

"The invention consists in insulating wires for electric tele- "graphs by covering them with a composition of gutta percha "and tar."

"About two parts by weight of gutta percha and one part of "coal tar" are mixed "together with the assistance of heat. This "composition is fluid while hot, but becomes solid on cooling;" it is employed "for coating and insulating wires for electric tele- "graphs."

[Printed, 3*d*.]

A.D. 1856, November 22.—N° 2769.

HENLEY, WILLIAM THOMAS.—"Improvements in electric "telegraphs and apparatus connected therewith."

These improvements are as follows:—

1st. A new "magneto-electro arrangement." In the machine described and shown, the soft iron and coils of wire (called the "armatures" in the Specification) are fixed between the poles of the permanent magnet, so that the ends or polar faces of the "armatures" are in the same plane as the polar faces of the permanent magnets. Pieces of soft iron, mounted on a non-magnetic disc, are moved before the said polar faces in such a way as to cause reversions of the polarity of the core of the "armature,"

thus "inducing a current of electricity in the coils of wire sur-"
" rounding the same." The advantages of this arrangement are, that a large "armature" can be used, and only a small weight has to be kept in motion.

2nd. In recording telegraphs, employing "slate, glass, or other " suitable material" that will admit of the signals being rubbed off, and of the material being used again for any length of time.

In the first arrangement a flat circular plate of "white slate" is made to revolve uniformly by clockwork, and a frame carrying the marking lever and electro-magnet is made to traverse from the centre to the circumference of the plate by a screw worked by the same train of wheelwork. A lead pencil attached to the marking lever makes a series of marks corresponding to the signals sent from the transmitting station in a spiral line extending from the centre of the plate to the circumference, or *vice versâ*.

In the second arrangement the signal-receiving surface is cylindrical, and the marking point is moved parallel to the cylinder's revolving axis.

Paper may be placed over the above-mentioned surface to receive the signals; it is, in that case, preferred to wash the surface of the paper "over with pumicestone powder and water," "letting " it dry before using;" this preparation enables the pencil to mark the paper with ease.

3rd. Constructing submarine or subterranean telegraph ropes." The gutta-percha-covered wire is coated "with tarred yarn in the " usual manner, then with tarred tape made of hemp or other " suitable material." On this is laid "a coating of iron wire and " strands of strong tarred yarn, the strands of wire and yarn " placed alternately, so that the wires do not touch each other, " being separated by the strands of yarn. The coating of tape " prevents the wire strands from cutting the gutta percha wire " more effectually than the first hemp covering alone would do."

[Printed, 1*s*. 3*d*.]

A.D. 1856, November 29.—N° 2831.

CLARK, JOSEPH LATIMER (*partly a communication*).—This invention consists of an improved insulator for electric telegraph line wires suspended in the air.

The peculiarities of the insulator are as follows:—It is of the form of an inverted cup, a smaller cup being "contained concentri-

" cally within the exterior insulating cup, and springing from the " interior thereof so as to be protected by it." The notch for receiving the wire is on the top of the insulator, and is cut obliquely to the direction of the wire; as the notch deepens it assumes more nearly the direction of the wire, until at the bottom its direction coincides with that of the wire; thus the wire cannot escape from the notch. The supporting staple is cemented into a suitable hole in the centre of the inner cup, and is carried either by a bracket screwed to the side of the telegraph post, or by a socket fixed to its top. "The interior surface of the exterior cup of the insulator," and the exterior and interior surfaces of the interior cup have "a " series of circular grooves" formed on them, thus increasing the insulating surface interposed between the line wire and the supporting staple of the insulator. The insulator is of earthenware, glass, or other non-conducting material, and the staple "is coated " with shellac, marine glue, or other suitable insulating material." The staple is free to move in the socket; the insulator is thus easily taken down for cleaning.

[Printed, 9*d.*]

A.D. 1856, December 11.—N° 2934.

BURKE, Michael.—(*Provisional Protection only.*) "Improve- " ments in mariners' compasses to counteract local attraction."

This invention " consists in constructing the boxes of mariners' " compasses in such a manner that the magnetic needle and its " card, being enclosed in a lesser and water-tight glazed case, can " be surrounded with water, spirit, oil, or any other suitable liquid " in the outer box or case. The lesser box or case, in which the " needle and card are suspended, may be variously constructed of " metal with a glass face, secured air and water tight, which " glazed box is then to be suspended in a larger metal or other " glazed box or case by methods customarily used, and the water " or other liquid poured in, and may be screwed or otherwise " secured."

[Printed, 3*d.*]

A.D. 1856, December 12.—N° 2949.

FONTAINEMOREAU, Peter Armand le Comte de (*a communication*).—(*Provisional Protection only.*) "Improved railway " signal apparatus."

"This invention relates to an improved method of forming "telegraphic signals for railways, which method consists in fitting "to the rails at suitable distances a rod, which projects a little "above the rail, so that when the wheels of a train pass over it "they depress it, and thus put into action the 'manipulator,' "provided with a suitable spring playing between two metal con- "ductors, so as to establish a current of electricity (generated "from batteries placed at convenient distances in the line) between "the manipulator and 'receiver' connected with the signalling "apparatus. The receiver consists of a box or case containing "an electro-magnet provided with wires in communication with "the battery, earth, and manipulator. Upon the top of the "magnet is an armature, for putting in action, by levers, the "wheelwork connected with the signals. In working the appa- "ratus the current is made to pass through a relay magnet placed "in the case.

"Upon the axis of the escapement wheel is fitted the signal "arm, which rotates on its centre before a disc one quarter of a "revolution at a time, so as to indicate 'danger' when the arm is "in a horizontal position (the electric current being then closed), "and 'all right' or 'line clear' when the arm is in a vertical "position, the current being then broken."

"One or more of the manipulators and receivers may be placed "at suitable distances from each other on the line of railway."

"The electro-magnets of the signals which precede each station "in closing the line shut a special circuit by means of two contact "springs within reach of the armature. In this circuit and in "the station itself is interposed a bell arrangement, which an- "nounces the arrival of the train, until on entering the station it "acts on the manipulator of the signal within."

[Printed, 3*d*.]

A.D. 1856, December 17.—N° 2992.

COWPER, Charles (*a communication from Louis Isidore Caussinus*).—(*Provisional Protection only.*) "Certain improvements in "electro-plating."

An electro-depositing solution composed of the cyanides of potassium, silver, and copper, is used. In the depositing cell, a positive pole of carbon is employed, "and this carbon is immersed "in the silvering bath to a depth which can be adjusted by a

" slide, so as to regulate the action. The bath may be used hot
" or cold. The objects are allowed to become covered with cop-
" per, and they are then agitated several times in the bath until
" the copper is replaced by silver. They are then scratch-brushed
" and again placed in the bath and treated in a similar manner.
" If a thicker coating is required, it is effected by subsequently
" submitting them to the ordinary electro-plating processes. The
" proportions and details of the process admit of variation. By
" this means zinc, lead, tin, and wrought and cast iron, and other
" metals may be advantageously electro-plated."

[Printed, 3*d*.]

A.D. 1856, December 24.—N° 3059.

VARLEY, CROMWELL FLEETWOOD.—" Improvements in electric
" telegraphs," consisting of :—

" Coils of telegraph apparatus."—In the first arrangement, the needle is of soft iron, and is placed inside an oblong coil; the coil is enclosed (except at a division across the middle) in iron casings; these casings being connected respectively to the poles of a permanent magnet, serve to magnetize the soft iron needle as well as to render the magnetic power of the coil fully available when an electric current passes. In the second arrangement, the needle is permanently magnetized, and the coil is cylindrical; the coil is completely enclosed in an iron casing; a radial cut is, however, made in the casing "to prevent the formation of secondary cur-" rents in the iron." In the third arrangement, a soft iron needle is at rest between opposite poles of a permanent magnet, until it (the needle) is magnetized by an electric current passing through coils which surround it. In the fourth arrangement, moving coils are used, permanent magnets being fixed "so that the magnetic " rays are concentrated through the coils of wire;" in one example a single coil is used, and in another a double coil; in both cases magnets are placed "both inside and outside the coil, and " surrounding the latter as much as possible;" the coil wire is preferred to be of "aluminium" [aluminum?]; "the application " of moving coils to telegraphic relays" is an important part of this improvement.

A "double-action galvanometer," consisting of a polished disc-shaped "needle," free to vibrate within a cylindrical coil.—The coil consists of two distinct wires, and they are so connected that the

strong sending currents proceed only through the outer coil, and the weaker received currents proceed through both coils. The polished surface of the needle is to call attention by its motion.

"A self-switching key."—The key lever, besides having motion in a vertical plane to break and make the necessary circuits, also has motion (restricted by stops) in a horizontal plane; this arrangement enables the operator to bring the key over one of two sets of studs; if the key is worked in its normal position it sends a series of positive currents down the line wire; but if the force of the spring that keeps it in the normal position be overcome and the key worked over the second pair of studs, alternating currents are transmitted to the receiving station.

Induction coils.—The peculiarities forming the improvements in these instruments are as follows:—The whole coil may be encased with iron or iron wires. A series of flat induction coils may be placed side by side "so as to place the secondary wire for "the most part between two primary wires;" in this arrangement the soft iron cores of neighbouring coils have opposite polarity. The primary wire may be coiled upon the core in separate parcels, "all, however, electrically connected in one continuous series," "the intervening spaces being filled with secondary wire." Glass may be employed (either discs or tubes) to insulate the primary from the secondary coils, or portions of the secondary coils from one another. Wire or bundles of wire may be used "whose section "is square, triangular, or parallelopiped" [parallelogramical?] for induction coils and for the coils of telegraphic apparatus generally. Wires may be used, whose thickness progressively increases "as the inductive action decreases," for induction and other telegraphic and magneto-electric coils. In one coil "to be "used with condensers to produce electricity of very high "tension," the primary and secondary coils are carried radially parallel to each other, but insulated by glass discs; in a second coil to be used for the same purpose a cylindrical glass tube insulates the primary from the secondary coil, and the secondary coil is divided into portions, which portions are insulated from each other by glass discs. A thermo-electric battery is used to excite these induction coils, and thence to telegraph through moderate distances.

Finger keys to be used with induction coils.—In one arrangement the currents induced in the secondary coil both by the breaking and by the making of the primary circuit are turned in one

direction, thus sending two currents in the same direction along the line wire by the depression of the key, and two currents in the opposite direction during the rising of the key to its normal position.—To enable the currents to be transmitted in the above-described manner, the key lever and its tail respectively make contacts with studs in contact with one pole of the primary circuit, the key lever itself being in contact with the other pole; a commutator arrangement on an arm projecting vertically from the key lever, enables both the secondary currents to be transmitted in the same direction along the line wire. In another form of key adapted for long submarine circuits, a handle or winch is placed on the axis of a contact-making (or "cam") wheel, and of a commutator arrangement similar in its principle to that of the first key. "The "commutators are so arranged, that upon the handle" "performing part of its revolution, the first half or more of the currents "pass down the line in one direction, and the remainder of the "currents in the opposite;" thus a series of currents in one direction are used to produce a signal, "and a series of currents "in the opposite direction, to produce the interval between two "signals." The above-described finger keys are not particularly alluded to in the Provisional Specification.

A relay to be used "with the induction coils."—A contact-making lever is free to vibrate between the poles of four electro-magnets, two being on one side of the lever's axis, and two on the other side. The lever is magnetized by one pole of a permanent magnet, and the cores of the electro-magnets (when not electrically excited) are magnetized by the other pole of the permanent magnet; the lever is thus kept against a contact screw until an electric current passes, when it is attracted to one side and enabled to make the desired contact. When it is requisite for the contact-making lever to stand clear of the contact screws whilst no electric current passes, the cores of the electro-magnets are magnetized (when not electrically excited) by the same pole of the permanent magnet. Needle instruments and "railway signal instruments" may be mounted upon similar principles. This improvement is not particularly alluded to in the Provisional Specification.

"A step-by-step motion telegraph" in which alternating currents enable the pointer to give the signals, and a continuous current or several consecutive currents in the same direction bring the pointer to zero.—The step-by-step motion is given by the action of pallets (mounted on the axis of a soft iron needle)

on an "escape wheel, attached to a clock train;" the soft iron needle belongs to the third arrangement of "coils of telegraph "apparatus" (See 1st paragraph); one extremity of its (the needle's) axis is pivoted in the lever of the armature of an electro-magnet; the needle coil and the electro-magnet are both included in the line-wire circuit, but the alternating currents of momentary duration only excite the needle coil, thereby allowing the escape wheel to move step by step. When, however, several consecutive currents in one direction occur, the electro-magnet attracts its keeper, the pallets are taken out of gear with the escape wheel, and a pin on the liberated escape wheel, by then meeting a projecting piece on the lever of the armature, stops the pointer at zero. "To retard the development of magnetism" in the iron of the electro-magnet, a metallic tube or secondary wire surrounds the said electro-magnet.

"A key for working with a primary coil only."—A key lever and its tail (connected to the line wire) is so mounted in connection with springs and studs that on being depressed it breaks contact with the relay, then makes contact with one terminal of a primary coil whose other terminal is connected to the earth, then with a battery pole as well as the coil, the remaining battery pole being in connection with the earth. On rising to its normal position the battery contact is first broken, thus allowing a momentary induced current from the coil "to flow through the line "in the opposite direction to the original current." The action during the depression of the key is therefore to send a divided primary current along the line wire, and during the rising of the key to discharge the line wire from the effect of induction. "The "same general arrangement" may be used "for translation." This improvement is not mentioned in the Provisional Specification.

"A new disposition of apparatus" "for translating alternating "currents from one line to another."—Each line has in circuit besides the Morse relays a relay similar to that hereinbefore described (See relay for induction coils); the writing levers of the Morse machines have contact screws, as well as the interposed relay, which are so connected with a translating battery that it is only brought into action upon the passing of an electric current along one of the lines. "By this disposition of apparatus a posi- "tive current traversing one line causes a positive current to flow "down the other line, followed by a negative current of short

" duration, which is very useful for neutralizing the effects of the " charge in submarine cables and subterranean wires; it is also " good for overground wires. For working a single line (when " not translating) a Morse key must be substituted" for the Morse writing lever. This improvement is not mentioned in the Provisional Specification.

"Accelerating the passage of the electric wave through long " submarine or subterranean wires by keeping them in a state of " electric tension."—Opposed batteries (one at each end of the line) keep the wire in a state of electric tension, and neutralize each other's force; to produce a signal a third source of electricity is used (" either an induction machine or another battery"), " whose " poles are connected in the reverse direction to those of the " tension battery; or the same effect may be produced by reversing " the poles of the tension battery" "by a key" (See N° 371, 1854). This improvement is not mentioned in the Provisional Specification.

" The application of induction plates, similar to those used in " Ruhmkorff's machines, to relays, whereby the burning is reduced " and the action of the apparatus rendered more certain."

A modification of a battery formerly patented by the Patentee (See N° 2555, 1854).—" A portion of the metal plates is cut away " so as to leave an opening through which crystals of negative " salt can be dropped." The negative salt may be coated or ground up " with gelatinous or gummy matters, such as common " glue, &c., to cause them to be longer dissolving."

[Printed, 2s. 5d.]

1857.

A.D. 1857, January 1.—N° 5.

NOUALHIER, Eugène Théodore, and PRÉVOST, Jean Baptiste.—" Improvements in applying metals over hard, vitri- " fied, or any other surfaces by galvano-plastic process."

To coat vitrified or enamelled surfaces, the object is varnished or covered with gold size, then with copper leaf, and the whole left to dry completely; the said object is then electro-coppered (using a solution of sulphate of copper), cleaned, " smoothed by filing off " the asperities," " finished with pumice stone," and polished.

Instead of using copper leaf to make the surface conductable, "German gold dust or bronze powder containing much mer- "cury" may be employed; it is prepared by trituration with common salt; hot water is poured over the mixture, the salt dissolves, and the resulting deposit, dried, is fit for use.

To preserve the silvering of looking glasses from damp, the glass is dipped into a melted mixture of bees'-wax and tallow; as soon as it is cool, the parts to be electro-coppered "are prepared "with metallic powder, and treated in the same manner as before "mentioned."

To metallize soft surfaces, a human corpse, for instance, the following process is employed:—All the apertures are stopped with modellers' wax, the body is placed in a suitable attitude, and pulverised nitrate of silver spread over it by a brush or otherwise; it is then electro-coppered in a bath of sulphate of copper, "the "result being a metallic mummy."

To electro-coat with iron, a solution of protosulphate of iron is used.

The electro-coppered articles "may receive afterwards another "coating of either silver, gold, or platinum."

[Printed, 3d.]

A.D. 1857, January 5.—N° 39.

BRAITHWAITE, Frederick.—(*Provisional Protection only.*) "An improved mode of extracting the iron from tin ores."

"This invention has for its object an improvement in extracting "tin from its ores. It is well known that tin ores contain large "quantities of iron, and it requires much care and expense in "washing and calcining such ores in order to separate the tin from "the iron."

This "improvement consists in separating the iron contained in "tin ores *by the aid of magnets.* For this purpose the tin ores "are reduced by stamping, and are washed, and when requisite "calcined, as heretofore, the separation of the iron by magnets "being performed from time to time when the ore is in a dry state "after the successive washing processes."

[Printed, 3d.]

A.D. 1857, January 5.—N° 42.

OLDHAM, John.—(*Provisional Protection only.*) "An appa- "ratus for closing the supply cocks of gas burners."

"This invention relates to the employment of electro-magnetism "as a means of simultaneously closing the supply cocks of gas "lamps where a large number require to be turned off, as, for "example, in streets and very large works.

"According to this invention, it is proposed to connect the lever "of each cock or tap to be acted upon at one end with a helical "or other spring, which will always tend to keep the cock or tap "shut, and at the other end with a bar of soft iron by a short "length of wire or chain. Beneath this bar is fitted a pair of "electro-magnetic coils, in connection by ordinary insulated tele-"graphic wires with a battery at the gas works, or in any other "convenient locality. The whole of the coils are in communica-"tion with each other, so as to be in the circuit, and will con-"sequently be simultaneously demagnetized when such circuit is "broken. In turning the tap to light the lamp the bar of soft "iron is brought down on to the coils which have been previously "magnetised, and is by them consequently held down and the tap "kept open, the force of the spring being overcome by the at-"tractive power of the magnetic coils.

"It will, however, be evident that if the circuit be broken the "whole of the bars of iron will be released, and the springs will "close the several taps simultaneously.

"The regulation of opening of the top" [tap?] "so as to "adjust the supply to the desired amount is effected by increasing "or decreasing, as the case may be, the length of wire or chain "which connects the bar of soft iron to the lever of the tap, and "this adjustment may be effected by means of a screw."

[Printed, 3d.]

A.D. 1857, January 8.—N° 67.

HUGHES, EDWARD JOSEPH (*a communication*).—"Improve-"ments in the manufacture and application of compounds re-"sembling gutta percha and caoutchouc from flour, fibrine, "gelatine, and other vegetable and animal substances."

Amongst other applications of this invention, the compounds produced "may be made to resemble leather, india rubber, or "other similar substances, and made suitable *for covering*" [*electric?*] "*telegraph wires*, or other similar purposes."

The substances used in the above-mentioned compounds are as follows:—Flour, "vegetable substances containing fibrine, cellu-"lose, or starch;" "gelatine, choudrine" [chondrine?], "colline,

" caseine, resins, soaps, tar, asphalte, pitch, oils, and tannine, or
" tannine substances."

The general method of combining the component substances is by means of the heat of hot water or steam.

In one example given, the compound consists of a mixture of wheaten flour, gutta percha, "colophane" [colophony?], catechu, and glue or gelatine; and in a second example, wheaten flour, colophony, solution of caustic alkali, chondrine, and melted soap, are used.

[Printed, 4*d.*]

A.D. 1857, January 9.—N° 79.

JOHNSON, John Henry (*a communication from Etienne Lenoir*).—" Improvements in the application of the electrotype or
" galvano-plastic processes."

This invention consists of "the application and use to and in
" the electrotype process of a shell or skeleton made of platinum
" or other metal and introduced into the mould as an insoluble
" electrode, in lieu of the soluble anode" described in the Patentee's invention Provisionally Protected, December 21st, 1854 (See N° 2699, 1854).

"When gold and silver deposits are required, and when the
" opening of the moulds is large," a soluble anode is employed in addition to the above-described insoluble electrode.

[Printed, 4*d.*]

A.D. 1857, January 10.—N° 95.

BROOMAN, Richard Archibald (*a communication from Messieurs Grenet, junior, and De Fonvielle*).—" Improvements in
" galvanic batteries, and in apparatus connected therewith."

The batteries described and shown in the Specification and Drawings have the following peculiarities :—

The positive and negative elements are moved by mechanical means in the exciting fluid; "or the fluid is itself agitated or
" disturbed while the positive and negative elements are sta-
" tionary." A method of accomplishing this object, by forcing air through the solution from a blast pipe with flexible tubes, is described and shown; the air enters from beneath, and "sets the
" fluid in violent agitation."

As a further means of preserving the constancy and strength of the battery, the exciting fluid is caused to flow continuously into the cells, by means of suitable channels.

With the above-described improvements, there is used a highly oxygenated solution, such as that of "bichromate of potassa" or "binoxide of manganese."

It is also proposed to "employ the air process for agitating the "exciting fluid in contact with the carbon when the carbon is "separated from the zinc plates by porous diaphragms or by "porous cells, and when acidulated water is used to act upon the "zinc, and when an oxygenous solution is used instead of nitric "acid."

[Printed, 6*d*.]

A.D. 1857, January 15.—N° 129.

BEDSON, George.—"Improvements in coating and insulating "wire."

Amongst other applications of this invention, it may be used "for insulating wire when it is employed *for conducting electro-"magnetic currents*, or other such purposes."

This invention relates to the insulating compound, and consists in employing such a mixture of caoutchouc, tar, and shellac "as "to be solid and elastic when cold."

Vulcanized or other caoutchouc or gutta percha may be employed; any bitumen may take the place of the tar, and any other resinous substance may be used instead of the shellac, but the above-described mixture is preferred.

The caoutchouc or gutta percha is dissolved in rectified tar oil or other solvent, and the whole is melted together with the resin and bitumen, "so as to form a solid and elastic mass when cold."

The wire may be coated by passing it through a vessel containing the fluid mixture.

[Printed, 3*d*.]

A.D. 1857, January 22.—N° 193.

RUBERY, John.—"Improvements in runners, top notches, and "other parts of umbrellas and parasols."

Malleable cast iron is used "in place of the metals heretofore "employed;" and the articles "are cast and annealed, and are

" shaped, cut, and finished to the forms desired as when using " brass for such articles."

This invention "also consists in making the notches of runners " and the top notches of umbrellas and parasols from two some- " what hollow or dished discs of sheet iron or steel."

This invention further "consists in finishing the runners, the " top notches, and other parts of the furniture of umbrellas and " parasols when not of brass by coating them with brass by the " electrotype process. For this purpose the articles of umbrella " or parasol furniture are made of steel, iron, or other metal (not " brass) in the usual way, and they are thoroughly cleansed by " pickling and scouring with sand; they are then placed in the " depositing bath, and brass is deposited on them to the desired " thickness in the ordinary way."

[Printed, 5d.]

A.D. 1857, January 23.—N° 211.

BALESTRINI, PIER ALBERTO.—"Improvements in electric " telegraphs," consisting of :—

1st. "A means of connecting the ends of submarine telegraphic " cables to the shore," and "protecting them from rubbing against " rocks or on the shore." "The cable is passed through a series " of cylindrical blocks of wood placed at short distances apart, " around each of which a bar of steel is wound spirally" [helically?], "the blocks of wood being held together by chains. One " end of the series of blocks of wood is fixed to the shore and the " other end to the cable."

2nd. "A means of joining the ends of two or more submarine " telegraphic cables together." The ends of the cables to be joined are passed through small jointed tubes into a cylindrical box, " and are held there firmly by a clamp or by other suitable " means, the openings through the tubes being closed perfectly " water-tight." The ends of the telegraphic wires of the cable are passed into another smaller box with a cover, and a communication made "between the wires opposite each other by clamping " them between plates of copper." The external cylindrical box has a cover bolted on to it, which cover carries "a hook for lower- " ing the box into the water;" the box also has a ring supported by projecting arms, which ring enables an anchor to raise the box. The interior of the smaller box is filled with resin in order

to insulate the different wires from each other; but suitable provision is made for unclamping the wires.

3rd. "Winding around the centre core of submarine cables, on "which the insulated wires are laid, a thin copper wire in long "open spirals" [helices?], "in order to carry off the induced "electricity from the insulating material."

[Printed, 1*s.* 1*d.*]

A.D. 1857, January 26.—N° 232.

HIGHTON, Edward.—"Improvements in electric telegraphs."

This invention consists in:—

1st. "Using an additional battery to neutralize the influence of "the line current on the instrument at the sending station." The neutralizing current from the additional or "counteracting "battery" is brought into action by a short circuit made at the same time as the line circuit is completed, in the opposite direction, and only including the coils of the sending instrument. According to the above arrangement "there is no necessity for a "separate counteracting coil wire" (as usually employed), and "each counteracting battery adds to the power of the effects "produced by the main battery on the distant coil." "When a "main battery is used at each sending station," "the instrument "coil at each distant station is to be provided with a counteracting "battery."

2nd. Telegraphing through submarine wires by means of apparatus "so arranged as always to produce the telegraphic indication "by connecting the zinc pole of the battery with the line wire, "and the copper pole with the earth to complete the circuit," in place of connecting the submarine wire with either pole at various times. By this means any point of the submarine wire that may be in contact with the sea water "is preserved from oxidation and "decay."

3rd. "Causing an electric current from the zinc pole of a "battery to pass through the submarine wires of electric tele"graphs, at all times when the telegraph is not in use, in order "to prevent oxidation or decay."

The 1st and 3rd improvements are elucidated by reference to the proposed submarine telegraph between England and America.

[Printed, 10*d.*]

A.D. 1857, January 28.—N° 242.

HUNTER, COLIN.—(*Provisional Protection only.*) "Improvements in bleaching or cleansing textile fabrics or materials, and materials used for making paper."

This invention "has for its object an increased rapidity and economy in the operation of bleaching or cleansing.

"The invention consists essentially in employing a current or currents of the electric fluid, generated or excited in any convenient manner by any suitable apparatus in combination with the chemical agents used in the bleaching process in such a manner as to promote, excite, or hasten the chemical action of such agents upon each other, or upon the colouring matters in the materials which are being bleached.

"According to one modification the electric fluid is made to act in a dash-wheel or rotating chamber containing the materials to be bleached or cleansed, carbonic acid gas and chlorine being likewise introduced into such wheel or chamber, and steam also if found desirable."

"The electric fluid may be employed in various ways, being combined with or acting on any of the various chemical agents used in bleaching, and being used in conjunction with steam, or without it, and in any form or kind of vessel or chamber."

[Printed, 3*d*.]

A.D. 1857, February 19.—N° 484.

PRICE, DAVID LLOYD.—"Improvements in electric apparatus "for giving signals, and appliances connected therewith," consisting of:—

Improvements on the electric alarum, secured to the Patentee by Letters Patent, N° 2862 (1855), in which a feebler electric current liberates the centrifugal hammer of the bell. The centrifugal hammer is caused to rotate by means of clockwork in the ordinary manner. Besides the wheels and pinions of the clockwork, there are two other axles totally independent of the said clockwork, but connected to the armature of the electro-magnet; each axle carries a toothed wheel, the wheels gearing into each other; the upper wheel has a projecting pin by which the armature turns the wheels on the excitation of the electro-magnet; an arm or "cross pin," on the hammer axis, usually presses

against the axis of the lower wheel, which is half round in section at the place of pressure. When the electro-magnet is excited, the two wheels are rotated, so that the half round portion of the axis lets the arm pass it; thus the hammer is liberated and the bell rung. Sometimes another toothed wheel on the hammer axis, gearing into a stop wheel, is used "to stop the rotation of the "hammer when the wheel acts on the said notches or stops "arranged for that purpose." Steel springs may be fixed to each end of the cross pin, "to break the momentum when the electric "current is broken."

"Improvements in the means of conducting the electric current "along the train of railway carriages by preserving metallic con-"tact between the carriages, and yet allowing the carriages and "connections between them to be easily attached and detached; "and also in case the connections between the carriages become "drawn out beyond a certain distance by the carriages becoming "separated or otherwise, to cause the circuit of the electric cur-"rent to be completed by bringing the negative and positive "poles in contact, and by that means to act on the bell apparatus "placed on the engine or other part of the train." This object is effected by means of pieces of metal on the circuit wires, and connected metallically with them, the said pieces of metal being brought together, on the stretching of the conductors beyond a certain distance, by a cord attached to the connections between the carriages. The connections between the carriages are attached to blocks; the insulated wire having a certain amount of slack, and the blocks being attached to fixtures upon the carriage by an India-rubber or other spring, the wires may be drawn out a certain distance, and are thereby easily connected.

"Improvements in the means of completing and breaking the "electric circuit as applied to doors, windows, and other parts "of buildings or places, and to iron safes, desks, and other "articles." In the first instance the circuit is completed by a metal hand being moved from "off" to "on," a hand inside the box or chest making the connection indicated by the outside hand; or a clock hand may make the requisite connection when it reaches the time indicated on a dial. In the second instance a cross pin is pressed against a metal washer by a helical spring, thus completing the circuit, unless the stud of the cross pin is pressed inwards by the door being closed. In the third instance a metal spring fixed to a metal plate completes the circuit by

coming into contact with an insulated metal stud. Conductors may be formed by twisting an uninsulated wire round an insulated wire.

[Printed, 7*d.*]

A.D. 1857, February 23.—N° 526.

DEVINCENZI, GIUSEPPE.—"Improvements in producing "figures and designs upon plates for printing from," consisting of:—

1st. Producing "either regular grain or plain tints or fancy "figures," on metallic plates, "in order to engrave them in relief "by chemical *or electro-chemical action.*" By preference, lithographic ink is mixed with alcohol, and a zinc plate is covered therewith by means of brushes. The plate is then prepared as usual for zincographic printing (except that varnish is applied with a roller), and engraved as above mentioned. Before preparation any desired figure may be drawn in lithographic ink or chalk; and when the plate is varnished the design may be drawn with a varnish.

2nd. Paper stained or marbled by any oily or bituminous matter is transferred upon a metallic plate, and the plate engraved as in the 1st improvement. When oily matters are used the plate is prepared with varnish, as above mentioned.

3rd. "Instead of varnishing these plates," a resinous or bituminous substance may be powdered over them. "In the acquitinto "process" a regular grain may thus be produced.

4th. By preference, strong varnish mixed with alcohol is used to cover the plate, and to produce varied figures by means of brushes, combs, sponges, fabrics, &c. Figures and designs may be added by the varnish, and heat applied to produce variety.

5th. Drawing on a metallic plate with varnish, and engraving it "*by galvanic action.*"

6th. Producing designs upon stones, and engraving them by chemical action.

[Printed, 4*d.*]

A.D. 1857, February 28.—N° 588.

HARRISON, Charles Weightman.—"Improvements in ob-"taining light by electricity," relating to:—

1st. "The preparation of electrodes."

"Condensed gas-carbon electrodes" are formed by "placing "pieces of metal or other material in gas retorts, or in tubes con-"nected therewith, for the purpose of receiving a deposit of gas "carbon." When the pieces are coated to the desired thickness they are cut or ground down "to any required form of electrode."

Spongy or powdered metals are formed into electrodes by compression; in this way electrodes may be formed "of a combina-"tion of metal powder and plumbago or other form of carbon."

2nd. "The electric constant light apparatus." A positive cylindrical electrode is made to rotate on its horizontal or longitudinal axis, it also has an "onward motion in the line of its axis;" the negative electrode "is in the form of a point or pencil," it is vertical, and is opposite to the circumference of the positive electrode, directly above its axis. When the electric current circulates, an electro-magnet in the light circuit releases clockwork which moves the positive electrode, as described above, and draws away the negative electrode, thus producing the light between the point of the negative electrode and the portion of the circumference of the positive electrode immediately opposite to the said negative electrode. By this apparatus the light is produced at varying points on the cylindrical electrode, which points form a "spiral" [helical?] path on the cylinder's circumference; spur gear communicates rotary motion from the clockwork to the said cylinder's central axis, and a fixed hollow screw enables a "clip" attached to the cylinder to give it rectilinear lateral motion. The negative electrode is raised by means of a cord passing over pulleys, which connects the said negative electrode with the armature of the electro-magnet by means of a ring on the electrode holder, and a rod and clip arrangement n immediate connection with the lever of the armature.

3rd. "A mode of maintaining a very uniform distance between "a rotary disc positive electrode and a point or pencil negative "electrode. This mode consists principally in keeping in contact "with the periphery of a rotary disc electrode a roller or pulley,

" or other contrivance, which is connected by a chain or band, or " by levers, with a pendant or sliding point or pencil electrode, " whereby, as the positive electrode diminishes, the negative elec- " trode is permitted continuously to advance without causing " sudden fluctuations in the light." The Drawings show this method in combination with an electro-magnet, and rod and clip arrangement.

4th. " Improvements in producing a succession of flashes or " streams of light."

Reciprocating motion is given to two (or more) negative electrodes by means of electro-magnets in the light circuit; the armatures of the said electro-magnets acting upon levers connected with the negative electrodes in such a way that whilst one negative electrode is drawn away from the positive electrode, and giving light, the other negative electrode is in contact with the positive electrode. The negative electrodes are hollow pencils, and act in combination with a single positive electrode of mercury. The Drawings show the mercury contained in a covered glass vessel in which the light is produced; the glass vessel has communication by a small pipe at the bottom, and by a bent portion at the top, with an iron reservoir of mercury, in order that the level of the mercury may be unaltered, and that the vaporized mercury may be condensed in the said iron reservoir. A suitable electrotome completes the electric circuit through each electro-magnet and its electrode alternately.

Steel armatures may be employed "in connection with the " electro-magnet in place of soft iron, so that its residual mag- " netism shall serve to retain the electrode or electrodes in the " position assumed during the passage of the last current. On " the arrival of each succeeding current, the transmission of which " is regulated by a suitable electrotome, the electrodes are moved " or drawn away one from another by the force originated by the " current, a flash or stream of light is produced, and the residual " magnetism holds the electrodes in position for another electric " impulse."

Another mode of producing " successive flashes or streams of " light" consists in giving a " vibratory motion " to one or more negative electrodes by means of " an axial bar or magnet " used in connection with an electric coil.

This improvement is applied to successively illuminate any number of marine buoys or beacons in the following manner:—An electrotome, consisting of a suitably toothed cylinder rotated by electro-magnets in the light circuit, makes electric connection successively with light apparatus placed upon a number of buoys "moored around shoals or sand-beds, as, for instance, the Good-"win," thus causing "a belt of fire" to surround them. A submarine cable, composed of as many wires as lights, conveys the electric current from the teeth of the electrotome to the buoys.

5th. The use of a secondary or induced current from an induction coil ("with or without a condensing arrangement") in connection with a primary current to produce the electric light.

The primary current gives motion to the electrodes and the secondary current alone produces the light. It is preferred not to break the circuit of the primary current, but to reverse it.

6th. "Combining the currents generated in an inductive coil "with currents of magneto-electricity produced by the motion of "a conductor within the action of permanent magnets, so as to "increase its effect in producing light."

7th. "Effecting signals by electric light." An electrotome or arrangement of electrotomes let on the current at suitable intervals. To signal a number, the cylinder of the electrotome has teeth corresponding to the digits in the number, a gap in the consecutive teeth occurs between each digit, and a larger space at the end of the number; each time a tooth passes a spring or stud in the circuit a distinct flash of electric light is produced.

8th. "Indicating the depth of water by electric light."

A float within a tube, as it rises and falls "by suitable me-"chanical contrivances," "calls into operation different electro-"tomes, and these, by completing the circuit of the current, *give* "rise to flashes of light in number according to the depth of "water in feet."

"To distinguish this from other marine lights," it is made "a colored light by placing a colored glass before it," or by the use of the "improved metal electrodes" described in the *1st* part of the Specification.

[Printed, 1*s*. 11*d*.]

A.D. 1857, March 9.—N° 680.

CUMINE, JAMES ANDREW, and HUNTER, COLIN.—"Improvements in electro-magnetic engines and" [galvanic?] "batteries."

In a rotary electro-magnetic engine the fixed electro-magnets radiate from the rotating shaft as from a centre; they are fixed in the circumference of a circle equidistant from each other. The rotating shaft carries a number of equidistant soft iron armatures (on an armature wheel), which pass nearly in contact with the poles of the electro-magnets, the number of armatures being equal to or greater than the number of electro-magnets. The electro-magnets are divided into "series or conjoined sets," all those of one set being excited at one time; the electro-magnets composing each set are separated from others in the same set by the intervening ones which belong to other sets, the sets being excited in consecutive order until the first set are again included in the electric circuit. When the galvanic battery is connected to this engine, one set of armatures is attracted and brings the next set of armatures within the attractive influence of the next consecutive set of electro-magnets, to which the electric current is transferred by the action of the commutator just before the armatures are in a radial line with the excited electro-magnets; a continual repetition of this action produces a "peculiarly uniform" rotation of the central shaft. The commutator consists of wheels with conducting and non-conducting portions suitably placed on their peripheries: rollers (one in connection with each "set" of electro-magnets) press upon the wheels and excite the magnets, as above set forth. There are two commutator wheels, one arranged to excite the electro-magnets on one side of the armatures, the other arranged to excite the electro-magnets on the other side of the armatures; the current is transferred from one of these wheels to the other by a "spring," which can be set against one of two studs; the direction of motion of the engine is reversed by this means.

The improvements in galvanic batteries consist in "the use and "application of steel in the arrangement and construction of "electric or galvanic batteries in lieu or in place of copper, iron, "or platinized silver." In the examples given, zinc is stated to be used as the positive plate of the battery in connection with steel as the negative plate.

[Printed, 6d.]

A.D. 1857, March 11.—N° 702.

JONES, Robert Lewis.—"Improvements in regulating clocks "by electricity."

In this invention clocks are regulated "by combining or con- "necting a standard or regulating clock with one or more sub- "sidiary clocks in such manner that a current of electricity is "transmitted at regular intervals by the standard clock, and made "to retard or accelerate the motion of the pendulum or balance "of the subsidiary clock or clocks when necessary, so as to cause "it or them to keep time with the standard or regulating clock, "such subsidiary clocks being complete clocks, and capable of "going independently of the standard or regulating clock."

In applying this invention to pendulums, the "pendulum bob "may consist of a coil of wire which is traversed by the electric "current, and which passes around or over a magnet or magnets "during its oscillations; or the coil or coils may be fixed and the "magnet or magnets attached to the pendulum." The Drawings show various ways of completing the electric circuit by the standard pendulum, so as to transmit currents either every second or every two seconds.

This mode of regulating may also be applied to balance clocks in a similar manner.

If the clock pendulum or balance be behind the standard pendulum, the moving coil is drawn further on to the fixed magnet, and the motion of the pendulum or balance accelerated. On the other hand, if the pendulum or balance be in advance of the standard pendulum, the coil is retained on the magnet, and the motion of the pendulum or balance retarded.

[Printed, 10*d*.]

A.D. 1857, March 11.—N° 710.

COOPER, James Davis.—(*Provisional Protection only.*) "Im- "provements in producing engraved surfaces for surface printing."

"The drawing or design for the surface to be produced is made "on a block of wood, as for ordinary wood engraving, but after- "wards, in place of cutting away the white parts of the drawing "or design, so as to leave the lines standing in relief, the lines are "cut away, so as to leave the whites in relief. When this is done, "the wood block is coated with varnish, care being taken that

"the varnish does not run into the engraved lines, and one coat "of varnish is laid on after another until the necessary thickness "of coat is obtained; afterwards the parts where the whites are "broad are built up with cement, so as further to increase the "height of these parts.

"The next process consists in taking an electrotype in the "ordinary way from the block thus prepared, which electrotype "is to be used as the printing surface;" but before so using, it is ground down to an even face (by preference) "on a revolving "stone of fine texture, and the grinding process is to be continued "until the shallowest lines of the original block begin to appear.

"Lastly, the electrotype is mounted, and it may then be used "for surface printing as an ordinary wooden block is used.

"Blocks for surface printing from line engraved plates" are prepared as follows:—"An electrotype or reversed copy of the "plate" ("that is to say, a plate with projections to correspond "with the depressions of the original plate") is obtained; such electrotype is ground away "until a surface suitable for surface "printing is obtained."

[Printed, 3*d*.]

A.D. 1857, March 13.—N° 725.

JUVIN, Edmond Joseph Nicolas.—(*Provisional Protection only.*) "Improvements in producing printing surfaces."

This invention "relates to such surfaces as are printed from in "the manner of letter-press printing, which surfaces are prin- "cipally applicable for printing music."

A sheet of tin is suitably engraved, by punches or otherwise, and a gutta percha cast taken to prove the work. The requisite corrections having been made, a copper electrotype cast is taken of the tin surface; this cast is ready for printing from when backed up with a mixture of lead and antimony. "Instead of "using a deposit of copper, the lead may be cast at once on the "engraved plate of tin, and a block suitable to be printed from "thereby produced."

According to another method, a plaster cast is taken of the above-mentioned gutta percha surface; lead is cast in the plaster mould, and serves as the relief printing surface.

According to a third method, "the lead block in relief obtained "as last herein described, may be used to produce a concave cast

"in gutta percha, which is submitted to a deposit of copper by "electrical agency. The film of copper so deposited is then "backed up with lead to form a block to print from."

[Printed, 3d.]

A.D. 1857, March 17.—N° 744.

ASKEW, Charles, ASKEW, John, and MYERS, Henry.—This invention is entitled "Improvements in hydraulic and "refrigerating apparatus for the purpose of raising sunken vessels, "anchors, and all other submerged bodies with light and other "certain apparatus used for the same purposes;" it relates principally to apparatus for raising sunken vessels, but a "safety "pneumatic diving cage" is described and shown, which is used (amongst other purposes) "*for laying down and recovering*" [*electric*?] "*telegraph cables.*"

The "safety pneumatic diving cage" is "constructed of wrought- "iron tubes or bars and heavy spike weight rests;" it carries "on "its head or top a dome conical centre air cylinder or chamber." "The air cylinder or vessel" "is arranged in either one or two "compartments, so, if necessary, it both furnishes air to the "diver, and also enables him to remove his helmet if oppressed "with fatigue." The "cage" has also the following adjuncts:— "Valves or air cocks, for enabling the divers to supply themselves "with air in case of accident or otherwise;" "guide break rollers, "attached and affixed on each side of the cage, to keep it level "while lowering, and stopping it at any point required in its "descent;" levers on each side, acting on and keeping the guide "roller" tight to "guide suspension ropes," "which have affixed "to their ends two heavy weights," "to keep them vertical and "sinking;" "two sliding doors, admitting ingress and egress "of the divers at will;" and "seats for the use of the divers to "rest themselves."

A lamp may be attached to the "cage" or to the helmet of the diver so as to derive air therefrom; the foul air has its exit through a tube having its orifice downwards.

[Printed, 1s. 9d.]

A.D. 1857, March 25.—N° 826.

OUDRY, Charles François Léopold.—"Improvements in "the preservation of articles of cast, wrought, rolled, and forged

"iron, zinc, and other metals or alloys of metals against oxida-"tion, from humidity and other destructive effects of air and "water."

This invention consists in electro-depositing pure copper to any desired thickness upon the above-mentioned articles, "after being "first coated with one or several coats of a composition in a liquid "or semi-liquid state, serving as an isolating and metallising "medium."

The process is as follows:—The articles are brushed, "dipped "once or several times into a hot or cold liquid varnish (the inter-"mediate coating)," withdrawn to dry, and dipped into another "liquid or metallic varnish." When the varnish is perfectly dry, the articles are electro-coated with copper by means of a solution of sulphate of copper, "which may be acidulated," washed, and dried.

The varnishes are composed of "resinous, gummy, or bitumi-"nous matters, combined with greasy or essential oils and metallic "salts, such as minium, white lead, litharge, cinabar" [cinnabar?], "and other agents having analogous properties."

After copper is deposited upon the above-mentioned articles, they can, if required, be gilt, bronzed, or silvered.

[Printed, 3d.]

A.D. 1857, March 28.—N° 869.

GIRARD, HIPPOLYTE BENIGNE.—"Improvements in insu-"lating" [electric?] "telegraphic wires or conductors, and in "apparatus for stretching such wires."

Telegraph wires are insulated "by the application of two coat-"ings, the first composed of graphite or plumbago, sifted and "mixed with glue or size, kept liquid by a gentle heat. This "coating, unaffected by water, preserves a certain elasticity, which "prevents any dilatation or contraction of the metal from acting "upon or being communicated to the second coating." The second coating is composed of two parts, which are fused together, having been previously fused separately; the first part contains dried linseed oil, "flower of sulphur," and gutta percha, the second part contains "orcansson" and tar. The wire to be coated is passed "in the hot melted mass" and allowed to dry and cool "before coming in contact with anything."

"To insulate suspended telegraph wires without taking them

"down," a trough apparatus is used, which is made to travel along the wires by means of a rope and pullies. The trough contains the insulating material, and may have lamps underneath to heat the composition and reservoirs at each end to receive the insulating material that runs off.

The "apparatus for stretching telegraph wires consists of a "wheel, a disc of porcelain, glass, or other like non-conducting "material, pierced through the centre to receive a metal axis, on "one end of which there is a ratchet wheel and on the other a "handle; a paul from a post takes into the ratchet wheel. The "end of a wire leading in one direction is connected to one side "of the disc, and the end of another wire leading in a contrary "direction is attached to the opposite side of the disc, so that "on turning the handle, both wires are stretched at the same "time."

For underground telegraphs, the wires, coated separately with the first coating and united into one mass by the second coating, "are placed in hollowed glass bowls;" these "bowls" have "a projection on one side, and a recess on the other," so that when they are put together (by means of melted sulphur) "they "form a passage through which the telegraph cable or wire is "passed." Porcelain or earthenware may be used to construct the "bowls" of, instead of glass.

[Printed, *7d.*]

A.D. 1857, March 31.—N° 887.

GOODE, Samuel Jabez.—"An improvement or improvements "in depositing metallic alloys by electricity."

This invention consists in using plates, of the metals of which the alloy is composed, in contact with the positive battery pole in the depositing solution, instead of a plate of the alloy itself, as hitherto practised.

The use of each metal separately in connection with the positive battery pole, and forming the anode or dissolving plates in the depositing solution, enable the proportions of the metals composing the alloy deposited on the negative battery pole or cathode to be regulated to the greatest nicety; for this purpose the plate of the metal depositing in too great a proportion may either be immersed to a less depth in the solution, or receded from the surface to be coated, or the plate of the metal not depositing in sufficient pro-

portion may be immersed deeper into the solution, or approached to the surface to be coated. In this manner the using plates of the separate metals composing the alloy enables the effects of variations of temperature and of battery power and of other disturbing causes to be completely compensated.

The alloy may be "composed of two or more metals."

[Printed, 3d.]

A.D. 1857, April 3.—N° 923.

BOX, William Henry.—"An improved fish hook."

This invention consists of:—

1st. "The application of the electroplating process to the "coating of fish hooks generally." They may be electro-coated "with gold, silver, or other metals when required."

2nd. "The peculiar mechanical application of a double swivel "to fish hooks, to the box of which the hook is directly attached "by means of a knob or pin-like head, and not to an eye as "usually practised."

[Printed, 3d.]

A.D. 1857, April 3.—N° 933.

BAUDOUIN, Felix Marie.—"Improvements in the wires or "conductors of electric telegraphs, and in the machinery for the "manufacture thereof."

The improvements are as follows:—

"The insulation of the wires or conductors of electricity by the "application of insulating coatings or coverings, consisting of "tapes or ribbons of tissue of textile or thread material them- "selves, either previously impregnated or not with insulating "matters, applied alternately with layers of insulating matters." The tissue may consist of paper, cotton, "gummed taffetas," or other woven fabrics; "the Bastennes bitumen" is the insulating material preferred, but other bitumens or suitable fatty or resinous bodies may be employed.

In one arrangement of machinery to coat the wire as above set forth, the supply and receiving drums from which the wire is respectively unwound and wound not only rotate on their own axes, but are mounted in frames which revolve on axes at right angles to those of the drums by means of any motive power. The

wire has thus a rotary motion about its own axis as well as a longitudinal motion. Between the wire reels and frames the wire receives, first, a coating of bitumen from a wheel rotating in a trough of hot bitumen, then successive coatings of textile fabrics from properly placed bobbins carrying the ribbons, each ribbon dipping into the bitumen trough before it arrives at the wire, and the helices which each ribbon forms having their "helical "junctions" covered by the super-imposed helix; "suitable dies "or parts" then scrape and smooth the coated wire. By means of a shaft parallel to the receiving drum's axis carried by its revolving frame, which said shaft has certain wheelwork and a double screw cam, the wire is wound in regular layers upon the receiving or winding drum. The same motive power rotates the frames of the supply and receiving drums by means of spur gear; the supply drum is fitted with a brake to preserve the wire of a uniform tightness, and the receiving drum is rotated by the motive power of the frames acting through a satellite wheel, screw, and screw wheel.

In another arrangement of coating machinery, the supply and receiving drums "have no rotary motion, except on their own "axes," the wire has therefore only a longitudinal motion. In its passage from one drum to the other, the wire passes first through straightening rollers, then through a bitumen bath, smoothing rollers, through a revolving bobbin frame where it receives the lappings of ribbon, smoothing and straightening rollers, to the receiving drum. The bobbin frame has the wire pass through its trunnions, and laps the ribbons consecutively on to the wire (as it passes) from bobbins mounted on suitably inclined axes, and having friction clips or brakes; the bobbin frame also carries a pair of smoothing rollers. In this arrangement it is not possible to pass the ribbons "into a bath of bitumen at the moment of "covering the wire with them, but they may be coated previous "to being wound on the bobbins."

Importance is attached to combining coverings of gutta percha or India-rubber with coverings of the kind herein-before described. In one plan of carrying out this improvement the inner coating is of gutta percha or India-rubber; in a second plan, the gutta percha or India-rubber forms the exterior coating.

"In forming telegraph cables of wires covered, as described," the wires are wound on reels, the said reels being placed in a frame

which rotates on its axis; "from the reels the wires all converge "to a point and pass out through the hollow axis of the frame, "by whose motion they are twisted together, the twisted end of "the combined wires being prevented rotating."

The wires, covered as herein-before described, may be arranged and united "in the form of flat cables or straps, either by attaching "them on to flat impermeable bands, or by weaving them with "hempen threads, which may previously be rendered impermeable "to electricity; the said flat cables or straps can be doubled or "covered above and below by thicknesses of tissue, also rendered "impermeable to electricity."

In laying round or flat cables under ground, they are either simply laid "in the trenches, coating them at the same time with "hot bitumen," or buried "in a long block or a sort of girder of "bituminous mastic," with which dry sand or other dry "earthy "matters" is incorporated.

Underground telegraphic wires are protected from the pernicious effect "of gas used for lighting purposes" by one of the following means:—

The cables or bituminous blocks in which the wires are buried may be covered with paper or metallic sheet; if paper is used, it is "treated with a solution of sulphate of copper or of a silicate, "then with insoluble soap, or any other preparation best capable "of resisting" the action of gas and humidity; if metal is used, its junctions are soldered.

In some cases the block may be covered with potter's clay or plaster.

"Gummed taffetas" may also be used for the exterior covering of cables and bituminous blocks.

[Printed, 1*s*. 6*d*.]

A.D. 1857, April 4.—N° 947.

TESTELIN, Emile.—"A new system for the application of "electricity as moving power."

The invention is founded on the following "new theoretical "views:"—

1st. "That the magnetic power which the iron bar of an electro-"magnet can acquire" is "proportional to the mass of iron of "which it is composed."

2nd. That "the electric power which can put into activity a "given quantity of this magnetism will be so much the greater, "as this same quantity of magnetism will be a greater fraction of "the magnetism of the total mass."

3rd. "That the action of the dynamic current of the iron bar of "an electro-magnet being in an inverse ratio to their respective "distances," the "branches" of electro-magnets are preferred to be long in proportion to the diameter of their helices; and a "number of helices" are preferred to be "disposed side by side "on the whole length of the branches or arms of the electro-"magnet."

4th. "That the multiplicity of volutions of the helix conductor "is but a secondary condition, which can only be admitted as a "rule inasmuch as the resistance which the conductor opposes "to the current, with regard to its length and section, must not "be under any circumstance superior to the resistance itself of "the pile."

5th. Instead of "encreasing the number of piles" in the battery, it is preferred to use plates of large surface, "and to dimi-"nish in proportion the degree of the liquid of the pile," in order to obtain strong, constant, and economical galvanic batteries.

The electro-magnets used in the practical application of this invention are constructed as follows:—The curved part (or "cross "bar," as the case may be), joining the long "branches" of the electro-magnet, has a larger cross-sectional area than that of "the branches," and "to avoid the inconvenience resulting from "currents of induction," a longitudinal groove is made in each iron "branch" radially from the centre to the circumference. The Drawings show a horseshoe magnet made according to this principle, in which each "branch" carries a number of separate "helices" [spirals?] of flat ribbon wire insulated with varnished paper, each spiral having its interior extremity connected with the exterior extremity of the next in series.

In order to enable the attractive powers of the electro-magnets to act over a considerable space, a number of similar electro-magnets "furnish each of them in their turn a portion of the "space necessary to produce the desired effect." The electric current is transmitted successively through each electro-magnet, and the levers of the "armours" [armatures?] transmit the motion of the armatures to connecting rods, and thence to cranks

and a fly-wheel shaft "by means of articulated escapements," so that the stoppage of the movement of one armature does not influence the rest. The connection of the armatures with the cranks is made in such a way that "the greatest action of the armour" does not coincide with the dead point of the crank.

"The armour of soft iron, having a section at least equal to "that of the bar of the electro-magnet, is placed transversally on "both the poles, where it can oscillate on one of its longitudinal "edges, which remain always in contact with both the polaric "surfaces at the same time."

The Drawings show engines, constructed as described above, with a commutator composed of curved rods moving in mercury cups by means of an excentric on the fly-wheel shaft, and a "conical pendulum," working in a similar way, which interrupts the circuit whenever the velocity of the engine is too great.

[Printed, 10*d.*]

A.D. 1857, April 8.—N° 990.

BRIGHT, Charles Tilston.—"Improvements in laying down "submarine" [electric?] "telegraph cables, and in apparatuses "to be employed therein," consisting of:—

1st. "Measuring and indicating the strain exerted by a sub-"marine telegraph cable while being submerged," and "causing "the strain," when it has reached its highest point, "to act "upon and release a break strap or other retarding agent," so that "the cable will be free to run faster over the paying-out "apparatus, and thereby prevent fracture."

To measure and indicate the strain, the cable passes half round a sliding pulley whose axis is connected by a fork with the piston rod of a cylinder containing some retarding agent (such as metal or vulcanized India-rubber springs), the degree of compression of the springs being an indication or measurement of the strain; instead of compressing an elastic medium, the motion of the pulley may extend it, or the said motion may act upon weights. To indicate the strain upon a dial, a toothed rack connected to the piston rod may act upon wheelwork, and thence upon a pointer axis.

To cause the strain, when it has reached its highest point, to release the cable by its own power, the sliding pulley at that time is made to press upon one arm of a cranked lever, and thus to

cause a chain or other connecting medium to release the brake strap.

2nd. "Machinery for effecting the regular unwinding of large "coils of telegraph cable by placing in the centre or eye of the "coil an upright shaft, carrying one or more sheaves or guides, "by which the cable is taken hold of and guided from the coil to "the inner edge of one of the sheaves which is in a line with the "centre of the coil."

In one instance the coil is supposed to be made in vertical helices parallel to the axis of its core, in a similar way to that usually employed in coiling electro-magnets, induction coils, and other electro-dynamic coils. The upright shaft is stepped on the base plate of the coil, and is made to revolve upon a strain being applied to the free end of the cable. The requisite guide pullies are carried by a horizontal arm, to which is affixed an "upright "slotted guide," which revolves with the shaft, the lower end of the guide being supported by a roller working in a circular groove in the base plate; the arm carries a "heart wheel" and spur gear, and the "guide" a screw whose nut is the bearing of a pulley; by this means the position of the said pulley is constantly preserved in a line with the portion of the helix which is unwinding. The cable is thus carried over the said moveable pulley, over a fixed pulley at the extremity of the arm, and between two pullies, so as to go to the paying-out machinery in a line with the axis of the coil.

In a second instance the coil is supposed to be made, "as now "usually made, layer above layer." The machinery in this case merely consists of an upright rotating shaft having a guide pulley at the extremity of an arm, besides the central pullies that guide the cable to the paying-out drums.

In either of the above-described arrangements "a break may be "applied to control the rotation of" the upright shaft.

3rd. "Certain arrangements of paying-out gear for regulating "the egress of the cable from the paying-out vessel." "A series "of grooved sheaves" are employed, "mounted upon suitable "bearings, and in such manner that the sheaves are outside of "the frame which carries the bearings of their axles, whereby the "cable can be readily got at in case of need." The cable is carried "over one and under the other sheave alternately through "the series, and any kind of break may be applied thereto."

4th. Employing "an auxiliary vessel or vessels additional to "the vessel carrying the cable. In the event of fracture to the "cable at or near the vessel carrying it, the broken end, may be "recovered before passing from the auxiliary vessel. The cable "is passed over a sheave near the centre of the auxiliary vessel at "the side thereof."

In the Provisional Specification it is proposed to register the speed of the vessel "by the rotations of a vane submerged in the "sea" "being electrically communicated" to an indicating instrument on deck. "The total distance passed over by the vessel "and the total length of cable delivered into the sea are also "indicated by these registers."

[Printed, 10*d.*]

A.D. 1857, April 9.—N° 1012.

HADDAN, John Coope.—"Improvements in the manufacture "of and in the means of and apparatus for discharging pro-"jectiles," relating to :—

1st. "Manufacturing projectiles with touch-holes, openings, or "channels through or upon them, for the purpose of igniting "from the muzzle of a common mortar or gun the powder or "charge employed for the propulsion of the projectiles, and in "discharging such projectiles by means of electric wires or fuses, "or other equivalent means, inserted through such touch-holes, "openings, or channels, either before or after placing the pro-"jectiles in the cannon, mortar, or gun."

The electric wires (insulated from one another) pass completely through a hollow "stick," which is inserted into the conical end of a diametral "opening" or hole in the projectile, and completely through the opening, "so as to become inserted in the "propelling charge employed in the chamber of the mortar." When the electric circuit is completed, a fine platinum wire becomes heated, and discharges the gun, the said platinum wire being at the extremity of the conducting wires in the charge.

2nd. "Discharging projectiles" by means of a telescope, which may be removed "from the cannon or gun immediately before "discharging it."

3rd. "The manufacture of projectiles which consist jointly of a "projectile and a wad, the projectile tapering towards its tail end, "and the wad being readily separable from the projectile."

[Printed, 10*d.*]

A.D. 1857, April 13.—N° 1033.

PASCAL, JEAN BAPTISTE.—(*Provisional Protection only.*) "Im-
" provements in electric lamps."

In this invention "two currents of electricity" are employed; " the one being the main current in connection with the elec- " trodes, and the other a secondary one to keep the electrodes in " their proper relative positions. The upper electrode is mounted " and fixed at the top of the lamp stem, while the lower one is " supported from a float or piston, resting in a cylinder containing " mercury or other suitable fluid. The float cylinder is in con- " nection with another vessel or cylinder of mercury at or near " the same level. The upper part of this second mercury cylinder " is in communication by a bent pipe with a vessel containing " acidulated water, in which the wires or poles of the second " battery terminate. The primary current from the battery, " producing the light, passes through the coil of an electro-magnet, " which it excites and attracts an armature. The force of a spring " acting on the armature is opposed to the attraction of the magnet. " The armature is placed in the circuit of the secondary battery, " which it breaks when it advances to the temporary magnet, but " again makes it on receding therefrom by the force of the spring. " Supposing the electrodes to be in position to produce the proper " light, the primary current passing through the electrodes pro- " ducing the light will keep the armature up to the electro-magnet, " during which the secondary current is suspended; but sup- " posing the space between the electrodes to increase, the light " and also the strength of the primary current will diminish. " This diminished power of the current will cause the electro- " magnet to drop the armature, which immediately establishes " the current of the secondary battery, which in its passage " through the acidulated water decomposes it and generates gas. " The vessel being otherwise closed, it passes over and presses on " the surface of the mercury in the cylinder or reservoir, and " forces a part of the mercury into the cylinder supporting the " electrode, which is thus raised, & thereby renewing the " strength of the primary current, augmenting the light, and " again breaking the circuit of the secondary current to prevent " the further generation of the gas."

[Printed, 3*d.*]

A.D. 1857, April 14.—N° 1060.

NEWTON, William Edward (*a communication*).—" Im-" proved means of lighting gas for illuminating and other pur-" poses."

The object of this invention "is to light the whole or any " number of the gas lights employed in a public or other building " or district simultaneously, or without the necessity of lighting " each separately by hand, and to enable the gas chandeliers " and other suspended gas lights in theatres and other places, " and other lights in positions not easily reached by hand or " mechanical agency, to be lighted without difficulty."

In the Complete Specification the invention is treated of under the following heads:—

1st. Lighting the above-mentioned gaslights by the heat generated by an electric current on its passage through a fine "pla-" tina" wire. The depression of a finger key completes an electric circuit, in which is included a fine platinum wire over each gas burner; the platinum wire is coiled or "crimped, curled, or " tangled, so as to present a considerable amount of heated " surface near the orifice of the burner to insure the speedy " ignition of the gas."

"Gas burners in general" may have a similar arrangement of platinum wires, "for the purpose of being kept heated by the " flame from the burners and reserving sufficient heat to re-ignite " the gas if the light should be accidentally blown out or other-" wise extinguished."

2nd. The opening the supply cock to the above-mentioned gas burners by means of the electricity from the same battery that lights the burners. A second finger key, on being depressed, completes an electric circuit perfectly distinct from that lighting the burners, which said circuit includes the coil of an electro-magnet. A certain number of depressions of the key acts upon the cock, so as to open (or shut) it; for each time the circuit is completed, the electro-magnet's lever armature actuates a ratchet wheel on the plug axis by means of a "pawl."

[Printed, 7*d*.]

A.D. 1857, April 18.—N° 1097.

DAVIES, George (*a communication from Martin Sebastien Goddier and Hypolite Eugène Goddier*).—(*Provisional Protection only.*) "Improvements in the method of laying underground" [electric?] "telegraphic wires."

"The object of this invention is to facilitate the application or "laying of endless telegraphic wires under ground, by so arranging "and preparing the same that they can be conveniently folded, "and transported ready for use to the place where they are in-"tended to be laid, and can there be readily unfolded, and im-"mediately deposited in the trenches intended for their reception.

"The invention consists, firstly, in placing such telegraphic "wires either in grooves formed in wooden rails, or in longitudinal "channels or flutes formed in sheet metal, and then filling the "grooves or flutes in which the wires are placed with liquid "bitumen, or other water-resisting medium, in order to protect "and isolate" [insulate?] "them completely, and also in filling "with bitumen or other suitable material the space between each "grooved rail after they have been laid; and secondly, in leaving "a space between the ends of each rail, which allows of their "being folded up into a bundle or package of a convenient length, "so as to afford a facility for transporting a great length of tele-"graphic wires, ready for use, capable of being readily unfolded "without breakage, and immediately laid in the trenches in which "they are intended to remain."

[Printed, 3*d*.]

A.D. 1857, April 25.—N° 1175.

BURROW, James.—"Improvements in coating wrought iron."

In the Provisional Specification this invention is said to relate to the protection of "one or both surfaces of sheet iron and other "forms of wrought iron with a succession of coatings from solu-"tions alone, whether by galvanism or otherwise, of the oxides of "zinc, lead, tin, and copper in all their varieties and combina-"tion;" also to applying a glaze to wrought iron.

In the Complete Specification it is stated that the clean wrought-iron plates are to be placed in an "electrolytic trough," in which non-metallic pegs keep the plates in nearly a vertical position. Alternate "straps" "of the coating metal, and copper or zinc," have "one or both ends projecting above the ends or sides of the

" trough when bent into its shape and dimensions;" "the pro-" jecting ends" of the straps are connected "by means of any " good conducting metallic medium, or by placing the different " metals in contact with each other, taking care that they do not " touch except at the terminations. The ends thus united" are curved downwards, and "one termination of the series" is dipped " into a vessel containing an acidulated solution; the other" is immersed "in a vessel containing hot water, or heated sand bath, " or an alkaline solution." The plates to be coated are placed "in " contact with the zinc or coating metal of the series of straps."

According to another arrangement of the "electrolytic trough," carbonized wood and "straps" of the coating metal are placed in contact with each other, the sheets to be coated being in contact with the carbonized wood and with the "straps."

The sheets or plates are raised periodically, bringing them in contact with a buff leather roller, they are then inverted and lowered into their places, washed in biborate of soda solution, and dried.

A method of applying a glaze to wrought iron is described.

[Printed, 4*d*.]

A.D. 1857, April 27—N° 1180.

COWPER, Charles (*a communication from Hyppolite Landois and Léon Daniel*).—" Improvements in electro-plating and " depositing metals."

This invention consists of "the application in electro-plating and " depositing metals of solutions of gold and silver and other " metals prepared by adding tartaric acid to a double cyanide of " potassium and the required metal, and submitting the mixture " to pressure by closing the vessel containing it, or otherwise."

The action of this process is "to precipitate a tartrate or bi- " tartrate of potash, leaving the metal in the solution, which is " then in a fit state to be employed for the electro-deposition of " the metel." By inserting the stopper of the vessel the vapour of the freed hydrocyanic acid is confined.

" When the tartrate has precipitated and the reaction is com- " plete, the vessel is opened and the liquid is filtered; the tartate" [tartrate?] "or bitartrate remains on the filter, and the solution " which passes through the filter is then ready for use. If not " sufficiently acid," "tartaric acid is added" to the solution.

[Printed, 3*d*.]

A.D. 1857, April 27.—N° 1183.

BARNES, Edmund F.—"Improvements in" [electric?] "tele-"graphic instruments, and called an 'embossing telegraph.'"

In this arrangement the type wheel is rotated and the printing mechanism driven "by any proper power," the electric currents merely serving to liberate the step-by-step motion of the type wheel on the depression of a finger key at the transmitting station, and the printing mechanism on the raising of a key that has been already depressed.

The line-wire current actuates a "mutator" or relay at the receiving station, which brings into action a "resident" or local battery, thence actuating the whole of the telegraph receiving mechanism.

On the depression of a finger key at the transmitting station corresponding to the letter to be printed or "embossed" at the receiving station, a clutch is (through intervening levers and rods) put into gear with a constantly revolving clutch wheel, thus rotating a "a circuit breaker wheel" that makes and breaks the circuit until an arm fixed to the same axis comes into contact with the depressed key. Each interruption of the circuit actuates (as above alluded to) the electro-magnet of the local battery at the receiving station, and enables a letter or symbol of the type wheel to escape; as the "circuit breaker arm" and the type wheel are made to start from zero at each signal, they correspond in their motions, so that the letter whose key is depressed at the transmitting station is brought under the embossing hammer at the receiving station. At the first motion of the type wheel a click is forced out of a ratchet wheel on the type-wheel axis, thus setting free a detent arm on the axis of the printing mechanism, and enabling it to revolve half a revolution, so as to be in readiness for the stoppage of the type wheel to permit it to make another half revolution, and during that movement to emboss the letter, move the paper strip, and put the type wheel out of gear with the driving axle (by a clutch arrangement), so that it may be acted on by a cord and spring, and thus return to zero ready for the reception of the step-by-step movements necessary for the next signal.

Other peculiarities may be stated as follows:—

To discharge atmospheric electricity, the line wire has included in its circuit a "small platinum wire," which is made to pass in

at the top and out at a closed aperture at the bottom of a vessel containing acidulated water; points projecting from the line wire also "extend below the surface of the acidulated water."

In the "mutator" the armature consists of an U-shaped permanent magnet, and the "resident," or printing electro-magnet, has "two small straight bar permanent magnets" "introduced " into each leg" "and extending the length of the cores," they " being so arranged as to produce a north and south pole in the " resident magnet." The use of these permanent magnets serves to facilitate the charging and discharging of the electro-magnets, and to control their action with greater certainty than could otherwise be done.

As "the circuit breaker arm" and type wheel return to zero after any letter is embossed, "the whole machine, except the mu- " tator," is "self regulating."

The periphery of the "circuit breaker wheel" is undulated; it breaks and makes the circuit by means of a "hammer" and " anvil" arrangement, there being "a helical spring within the " body of the anvil."

The teeth of the escapement wheel on the type-wheel axis are arranged in two rows; the lever of the armature carries a "nip- " ple," which is vibrated (by the action of the local electric current) between the rows, and thus liberates the escapement wheel tooth by tooth.

The armature of the "resident" electro-magnet is enabled to move away from the electro-magnet, on the breakage of the circuit, by a reaction spring, which is adjustable by means of a slide and screws.

The axis of the printing mechanism carries an "embossing " cam," "paper-propelling eccentric," and "type wheel releasing " plane," "all firmly attached to each other, so as to render it " impossible they should get into different relative positions."

The "embossing cam" acts upon the type through the medium of a rod and lever; the "paper-propelling eccentric" acts on a click wheel fixed to the axis of one of the paper rollers by means of a click at the extremity of its rod; the "type wheel releasing " plane" liberates the type wheel from the motive power by the action of a "fork" at the extremity of a lever resting on the said " plane," thus enabling the type wheel to return to zero.

[Printed, 1*s*. 1*d*.]

A.D. 1857, May 2.—N° 1242.

GREENHOW, JOSEPH SEELIE.—" An improvement in alarum " apparatus when using electric currents."

This invention relates to "electric currents for working alarum " apparatus used in inhabited and other buildings, in order to " give notice on the opening of any door or window, or in the " event of fire taking place."

Instead of arranging the electric apparatus so that the completion of the electric circuit sets the alarum in action, the electric current is kept constantly flowing, and when its continuity is broken by a burglarious attempt or by fire, the alarum clockwork is released and the bell sounded.

According to the former plan, if the conducting wires are divided at any part, the apparatus is inactive; in the above-described improvement, however, any division of the conducting wires actuates the alarum.

[Printed, 3d.]

A.D. 1857, May 4.—N° 1252.

STANLEY, JOHN.—" Improvements in the construction and " mode of applying cranes and other hoisting machines to " hoisting, suspending, lowering, and weighing purposes; also " in generating, transmitting, and applying motive power for the " same."

This invention is described, in the Complete Specification, under the following heads :—

1st. The attachment of steam boilers "to fixed and portable " steam-wharf cranes," &c.

2nd. The corrugation of the heating surfaces of the boilers of steam cranes and other hoisting machines.

3rd. "The mode of transmitting the power of steam from the " place where it is produced to the work it is required to perform " in the operation of hoisting."

4th. "The construction of steam engines connected with cranes " and other hoisting machines, the work of which is intermittent."

5th. "The variety of degrees of power required in steam-hoisting " machines."

6th. The construction and fixing of wharf cranes or portable cranes, protecting the vertical axle bearings from wear and

weather, and supplying the "means of getting at such bearings "for the purpose of cleansing or repairing the same."

7th. Improvements in the arrangement and application "of "steam cranes of the adjustable and compensating derrick and "shear derrick class; also in the construction of some of their "parts."

8th. "A novel arrangement in the jib hoisting gearwork of der- "rick cranes and shear derricks generally."

9th. "Holding the jibs of derrick cranes in any required posi- "tion," by means of a "combination of a brake and ratchet."

10th. Improvements in derrick cranes.

11th. "A novel arrangement in part of the hoisting gearwork "of cranes, and applying weighing apparatus to the same," to ascertain "the weight of bodies lifted thereby."

12th. "Means of compensating for the difference in the weight "of chain hanging down below the weighing appliance connected "with cranes, &c."

13th. A novel mode of ascertaining the strain upon a chain, &c.; also of governing and regulating brakes, &c., in order to ensure one uniform strain upon the chain, &c., being payed out, whatever the speed of paying out may be.

Both these novelties "*are particularly adapted to the purpose "of submerging the cables of submarine electric telegraphs.*"

The following is the mode of operating:—

Firstly.—"To ascertain the strain." A poise or force (in the Drawing a weight in a scale attached to a pulley free to move vertically) is applied to the cable between two supporting pullies. The weight applied and the divergence caused enable the strain to be ascertained.

Secondly.—"To govern the strain." The lever of a brake is acted on by the above-mentioned poise; when the strain of the cable lifts the poise, the brake enables the cable to run more freely; and when the strain of the cable fails to support the poise, it then presses on the brake lever "and prevents more cable running out "until the strain is again reinstated."

The application of this invention to submerging submarine electric telegraph cables is not mentioned in the Provisional Specification.

14th. Improvements in the construction of levers used to strike, lift, and connect the parts of large weighing machines.

[Printed. 1*s.* 6*d.*]

A.D. 1857, May 4.—N° 1258.

WAY, JOHN THOMAS.—"Improvements in obtaining light by " electricity, and in employing light so obtained for lighthouses " and for giving signals."

In this invention "two flowing electrodes, such as two streams " of mercury," are employed, "one connected with each pole of " the battery and issuing from two jets, such streams meeting " each other at a point where one or both of them falls into " drops."

To economize battery power the circuit is rapidly made and broken. An electro-magnet mounted on an axis is included in the circuit, and is made to revolve by the presence of a permanent magnet so as to constantly break the circuit and complete it in opposite directions. The rotary motion thus obtained is also made to raise the mercury from a lower cistern into which it falls after ignition "to the cistern from which it issues," by means of a pump.

The other peculiarities of this invention are as follows:—

The use of cups of pipe clay in the invention secured by Letters Patent, N° 2547 (1856), and of jets of pipe clay in the present invention; instead of pipe clay, "pipe clay mixed with precipitated " silica or phosphate of lime" may be used. "These substances " are moulded to a suitable shape and burnt."

"The placing the glass so close to the light as to cause it " to become sufficiently hot to prevent the material, forming the " flowing electrode, from adhering to it."

"The use of talc in place of glass."

"The height of the column of the material forming the flowing " electrode from the jet on which it issues" is regulated by a graduated glass tube, the material being allowed "to flow into " this glass tube from an upper cistern through a delicate stop- " cock, by means of which the material can be maintained at any " desired height in the glass tube. Or, the jet is connected with " a cistern in which the material is kept at a uniform level by a " float so arranged as to regulate the descent of the material from " a cistern above."

In order to adapt this apparatus to signalling purposes, a spring and stud apparatus (like the finger key of an electric telegraph) is included in the circuit; by these means "flashes of light succeed- " ing each other at any desired intervals" may be produced.

To use the herein-described apparatus for lighthouses, it is surrounded "with glass lenses or zones, similar to those now in use " in lighthouses;" when "a flashing light" is desired, "a self-" acting apparatus, actuated by clock-work," may be used "for " breaking the circuit at determined intervals."

[Printed, 8d.]

A.D. 1857, May 5.—N° 1270.

WILKINS, William.—" An improved method of laying sub-" marine" [electric?] "telegraph cables."

This invention "consists in laying submarine cables through a " trail tube or carrier attached to the ship, and extending to the " bottom of the ocean or sea, or only to such depth as to deliver " the cable into still water," in order to "protect the cable from " too much strain."

The methods of carrying the invention into effect are as follows:—

It is preferred to make the "trail or carrier" of a metallic vertebrated tube, having two flat longitudinal iron wire ropes, each rope to be lapped half round the tube; they are sewn together with wire strands, thus leaving a space between for the water to enter or the lubricating grease to escape.

A buoyant tube, preferred to be of gutta percha, may commence at about forty fathoms from the ship, and (being fastened to the trail) assists in supporting the trail in the water.

The trail may be formed "of a buoyant tube supporting a series " of rollers in frames, the tube and the frames being connected by " means of wire ropes, to which they are riveted."

To further prevent the too rapid delivery of the cable, "a break" is sometimes attached at the extreme end of the trail. This brake consists of a series of grooved pullies mounted between iron plates. " The cable passes alternately over and under the successive " pullies," and through guide rollers into the sea. The grooved pullies have flat arms, which present themselves transversely to the water, and thus retard the velocity of the pullies and of the cable. The brake may be buoyed up by a flat buoyant tube.

[Printed, 10d.]

A.D. 1857, May 6.—N° 1274.

BECKER, Johann Phillippe.—" Improvements in the mode " of silvering animal, vegetable, and mineral objects."

"The invention consists in effecting the silvering of mineral, " animal and vegetable objects by submitting them to certain " fluids," "so that by electro-chemical action the object is accom- " plished."

A "compound fluid" is prepared, and is used in conjunction with other fluids or not, according to the nature of the article to be silvered. This "compound fluid" (which forms the peculiarity of the invention) consists of "No. 1" and "No. 2" fluids; these are preserved separate until they are required for use.

Fluid "No. 1" consists of a mixture of caustic lime, grape or milk sugar, racemic acid, and distilled water. The whole is " filtered, excluded as much as possible from the atmosphere, and " bottled up closely until used."

Fluid "No. 2" consists of a mixture of nitrate of silver, liquid ammonia, and distilled water; more liquid ammonia than will clarify the mixture thoroughly must not be used, or the precipitation of the silver will be prevented.

In general, the article to be silvered is dipped into the "com- " pound solution" after suitable preparation, and dried by air or heat.

[Printed, 4d.]

A.D. 1857, May 7.—N° 1291.

MORRISON, Duncan.—" A new or improved manufacture of " rollers or cylinders for printing fabrics."

This invention " consists in making the said rollers or cylinders " mainly of cast iron or malleable or wrought iron, and afterwards " coating the same with a layer or coating of copper, the said " coating with copper being effected by any of the well-known " electro-metallurgical processes whereby copper may be reduced " from solutions of its compounds upon a surface of iron."

The roller has a "nib" to connect it with the axis on which it is used; it also has grooves on its exterior parallel to its axis.

The following is the process used to electro-copper the grooved roller:—It is cleaned with acid, and the whole of the cylindrical surface (not including the grooves) is covered with varnish; the

"varnish is also applied to the interior and ends of the iron "cylinder." The grooves are then filled with copper by electro-deposition, using first a solution of oxide of copper in cyanide of potassium, then a sulphate of copper solution. The varnish is then removed from the cylindrical surface, which surface is cleaned and again electro-coated with a further deposit of copper.

A cylinder of iron without slots is sometimes employed, in which case brass or other alloy of copper is fused upon the surface of the cylinder, and a layer of copper electro-deposited upon the brass coating.

"By the methods described the deposited hollow cylinder of "copper is firmly fixed upon or made to adhere to the iron "cylinder.

"The surface of the coated cylinder may be made smooth by "turning, and finished and engraved by the ordinary processes."

[Printed, 5d.]

A.D. 1857, May 7.—N° 1294.

BRIGHT, Charles Tilston, and DE BERGUE, Charles.—"Improvements in apparatus to be employed in the laying or "sinking of submarine" [electric?] "telegraph cables."

This invention "consists in so arranging drums, pulleys, or "reels (outside a supporting frame), over the periphery or surface "of which the cable passes during its transit from the hold of the "vessel to the water, that the cable cannot slip and run out "without causing the drums or reels to revolve on their axes at "a speed equal to that at which the cable is passing; and in the "application to drums or reels, directly or otherwise, of a friction "brake capable of being adjusted and regulated so as to cause "more or less tension or strain on the cable, as may be required, "according to circumstances; in the employment of an indicator, "in combination with a drag or brake, to show the amount of "tension or strain on the cable; in the employment of a steam "engine, or of any other suitable power to run the paying-out "apparatus in a reverse direction, where it may be required to "raise up the cable; and in the employment of floats or buoys "to be attached to the cable at intervals, and allowed to run into "the water with it, and sink with it when required, in order to "take off or reduce the strain or tension of the cable."

The Drawings show the said drums "combined with cog " wheels in gear with each other and with another cogwheel," " the motion of which is controlled" by a brake.

Collars acted upon by screws form the brakes; levers are also attached to the brakes, and are joined to "counter levers;" the counter levers are linked to a lever attached to a Salter's spring balance or other indicator.

[Printed, 10*d*.]

A.D. 1857, May 13.—N° 1350.

NEWALL, Robert Stirling.—"Improvements in the manu- " facture of wires and strands for electrical purposes."

This invention "relates to wire strands employed for submarine " and other electrical conductors."

If the strand be composed of a number of wires, "a large surface " in the aggregate is exposed to the insulating substance. This " large surface acts prejudicially when the wires are insulated and " immersed in water, as it increases the difficulty of getting rid " of what is known as 'the charge,' in proportion to the surface " of the wire exposed to the insulating substance."

This invention "consists in effacing the irregularities of the " external surface of the strand by reducing it to a cylindrical or " other regular form, by drawing the strand through dies, or by " passing it through rollers, or similar apparatus, or by filling " up the interstices with tin or other suitable metal, and reducing " the same to the required dimensions with an uniform sur- " face."

When dies or grooved rollers are employed, they are mounted " at the point of the machine for making the strands, where the " wires unite together in the process of laying them."

When "tin or other suitable metal" is employed "to fill up " the interstices of the strand," it is caused "as it passes from " the strand machine to descend into a bath of the melted metal, " there being for this purpose a pulley or bar at the bottom of " the bath, under which the strand passes, and a layer of sal- " ammoniac or other flux is placed on the surface of the metal." " As the strand passes out of the bath it is drawn through a ring " or die, which scrapes off the superfluous metal," it is then passed "through another die, so as to reduce slightly the diameter " of the coated strand or wire."

[Printed, 3*d*.]

A.D. 1857, May 19.—N° 1400.

VASSEROT, Charles Frédéric (*a communication from Auguste Trouillet*).—This invention is entitled "a typographical numbering "apparatus," and the following applications of galvanic force are mentioned in the Specification:—

Amongst other methods of manufacturing the "typographic "circles," it is proposed to solder or rivet on the circles a band made "by the process of galvanic stereotyping;" the said band is "formed of the thickness of the copper deposited in the opera- "tion," the band is first shaped into a ring "by soldering the "two ends."

"The said cylinder covered with a galvanic envelope," may be applied "to cylindrical printing," and thus "greatly increase the "number of proofs of one type in a given time."

The application of the "typographical numbering apparatus" "to the typographic impression on the presses, usually employed "with or without addition of text or vignettes," "allows to print "& to number simultaneously by the same pulling the shares, "bank notes, tickets, &c., &c." "For this effect" "the steel or "copper plates, or those obtained by the galvano-plastic process," are "scorped" "at the place of the numbers, so that those plates "may be superposed on a frame with the numbering apparatus. "This combination will necessitate the suppression of the "ordinary means of guarantee against the falsification of the "numbers, which are placed in the plate and printed usually in "coloured ink before the pulling of the text. The adjusting of "the galvanized plate is made by means of a lead plate rivetted "to it, & of supports, which fill the interstices of the apparatus, "so as to maintain a constant level of the surface."

[Printed, 1*s*.]

A.D. 1857, May 20.—N° 1412.

HARRISON, Charles Weightman.—"Improvements in ob- "taining light by electricity," consisting of:—

"The manufacture and employment of electrodes of melted "compounds of metal with other elementary bodies." Those compounds preferred are as follows:—"The peroxide, and the protoxide "of potassium," "the mixed protoxides of potassium and sodium," "the double chlorate" [chloride?] "of sodium and allumimum"

[aluminum?], the fluoride of lead, and the sulphide of copper, "which yields a fine green light;" of the metallic salts, "the "mixed carbonates of potash and soda," in certain proportions may be used, also "the fused nitrate and chlorate of potash."

"The manufacture and employment of electrodes of melted "metal, and of compounds of two or more metals when made "fluid by heat." The metals and metallic compounds preferred are as follows:—"Potassium, sodium, zinc, tin, lead, and bis-"muth;" also certain proportions of sodium and zinc, of tin and lead, of zinc, bismuth, and lead, of bismuth, tin, and lead, of lead, tin, and sodium, and of bismuth, lead, tin, and mercury.

"The construction and employment of a float in combination "with a reservoir of a fluid electrode, whereby evaporation or "consumption of such electrode by the light is confined to an "aperture therein."

These improvements are carried out in the following manner:—

According to the nature of the material, it may either be employed (in connection with a carbon electrode) as "a flowing or "stream electrode," or used in a reservoir. The stream or reservoir electrode is connected with the positive battery pole, and the carbon electrode with the negative battery pole.

The material may be made fluid either by the application of heat from steam or other source, or by the heat of the electric current which produces the light; in the former case the fluid electrode issues from a small regulated orifice in a pipe connected with a heated reservoir; in the latter case a pencil electrode of the material is placed in "a clay or glass tube" with a small orifice at its mouth, a copper "slide rod" conveys the electric current to the pencil electrode.

It is preferred "to use two pencil carbon electrodes in combina-"tion with one positive stream electrode, and to arrange these in "a right line, one on each side of the stream."

The negative electrode may also be a fluid electrode.

When a reservoir of a fluid body is the positive electrode, "a "cylindrical glass vessel" is used containing mercury; upon the mercury is placed a conical float, whose base fits accurately within the reservoir. The float is made "of refractory clay, or of pla-"tinum," "a small aperture being formed through it from the "apex to the base," into which aperture the mercury is impelled "either by the weight of the float itself or by other pressure." A

carbon pencil electrode, free to work vertically over the reservoir, has its motion controlled "by an electro-magnet and keeper, or by "a helex of the conducting wire."

[Printed, 4d.]

A.D. 1857, May 20.—N° 1417.

KEOGH, HENRY, and KEOGH, FFRENCH AUGUSTUS.—(*Provisional Protection only.*) This invention is "for lighting the "public gas lamps in the cities and towns of Great Britain and "Ireland by electricity, and for turning off and on the gas to same "simultaneously."

Insulated conducting wires are laid under the roadway, "and in "succession run up the inside of each lamp-post." At each gas burner, "a small piece of platinum" or other suitable metal severs the electric wire, but is connected to it. "The current of "electricity encountering resistance at each of these pieces of "metals will produce a spark which will ignite the gas when "turned on."

The gas taps are placed at the bottom of each lamp-post, and have small toothed wheels that gear into a horizontal bar extending the whole length of a street or streets, and placed under ground in a suitable casing. At a suitable place a hollow iron pillar is fixed, containing a handle mounted on the axis of a large toothed wheel gearing into the above-mentioned horizontal bar. On the movement of the handle, the horizontal bar is moved parallel to itself, and communicates motion to the gas-tap wheels, thereby turning the gas on or off. "The galvanic battery been" [being?] "then fired, instantaneous illumination of all the lamps will be "produced."

[Printed, 5d.]

A.D. 1857, June 1.—N° 1540.

WALENN, WILLIAM HENRY.—"Improvements in the electric "deposition of metals and metallic alloys."

This invention consists of "the application of the tartrate of "ammonium and cyanide of potassium in combination, in a so-"lution used for the electric deposition of metals, or any modifi-"cation of this combination, according to the metal or alloy "required to be deposited."

An aqueous solution of the above-mentioned salts forms the solvent solution or menstruum, which, when charged with metal, is the electro-depositing solution required. The proportions in which the ingredients are mixed differs for each metal or alloy; those for copper, silver, gold, bronze, and brass are set forth.

The methods of charging the solvent solution with metal are as follows:—First, by dissolving therein "cyanides, tartrates, car- " bonates, or any other suitable salt or salts, compound or com- " pounds of the metal or metals to be deposited;" second, by means of electric power, "using a large positive plate of the metal " or alloy," and "a fine wire for a negative plate."

To deposit alloys, electric power "capable of evolving hydrogen " freely at the negative pole" should be used. "The proportions " of the tartrate of ammonium and cyanide of potassium are " alterable according to the relative proportions of the metals to " be deposited, the color of the resulting alloy being also deter- " minable by this means."

For ordinary purposes the solution is used cold.

[Printed, 4*d*.]

A.D. 1857, June 1.—N° 1547.

HOGA, Stanislaus.—(*Provisional Protection only*.) "An im- " provement in coating the surfaces of the cells of galvanic bat- " teries, and also the surfaces of crucibles."

This invention "consists in the improvement of the cells of " galvanic batteries, and also of crucibles, by the deoxidation of " platinum and iridium by heat when applied to such surfaces."

"For this purpose a solution of these metals is applied over " such vessels, when made of certain aluminous earth or of a car- " bonaceous substance, which being heated, the metals are decom- " posed, and a thin metallic substance remains tenaciously adherent " to the surfaces. By the above process, the whole of the inside " of the cell of a galvanic battery, being lined with a metal coating, " is converted into a most perfect negative element, and the use of " a plate of platinum may be thus dispensed with."

For crucibles, the usual crucibles of graphite or plumbago are " made use of; for small ones, "the better substance of carbon, " which is formed in gas retorts," or "the carbonated iron which " is formed in the bottom of the same retorts," is employed. The exterior surfaces of such crucibles are passed over with "a brush

" moistened with the metal solution;" the same is subjected to heat, " by which metallic surfaces are produced on the outsides " of the crucibles, which will prevent the carbon combining with " oxygen, and consequently the crucibles will be preserved from " being burned when in use."

[Printed, 3*d.*]

A.D. 1857, June 9.—N° 1609.

TUCK, Joseph Henry.—(*Provisional Protection only.*) " Improvements in the application of light to facilitate operations " under water."

This invention " consists in adapting and applying the electric " light, and gas, and other lights, to facilitate operations under " water."

" As respects the electric light, the object is accomplished by " using the ordinary or other suitable apparatus for the production of this light." " The ordinary battery for the purpose may " be fixed either at or above the surface of the water, or it may be " fixed to or near or contained within the bell, suitable wires being " conducted from the battery to a transparent or other lantern " containing the electrodes or points of combustion and light. " This lantern may be fixed in any suitable position, either inside " or outside the bell, or at or above the surface of the water, or it " may be portable and used as an ordinary lantern by the operator " within the bell, or by the diver in the ordinary diving dress. " The conducting wires are insulated in the usual manner by " gutta percha or other suitable covering for protection in submarine operations."

The application of gaslight and other lights " to illuminate " objects under water" is also set forth.

[Printed, 3*d.*]

A.D. 1857, June 12.—N° 1649.

DAVIES, George (*a communication from Nathan M. Phillips*).— " Improved apparatus for weighing grain and other articles, to be " called 'the electro-magnetic grain scale.'"

This invention consists of " the application of an electro-magnet " to operate the inlet and delivery valves of a scale for weighing " grain and other articles of a similar nature, by making a connection between the positive and negative poles of a galvanic

" battery by means of the tilting or raising of the beam of the " scale."

The Drawings show " a lever scale beam " or steelyard " of the " ordinary construction, with a hopper " " attached to its short " end to contain the grain to be weighed ;" the electro-magnet's armature acts on the inlet and delivery valves by means of a suitably placed lever to which it is attached. As soon as the requisite weight of grain has fallen from the inlet valve attached to a bin placed immediately over the hopper, the electric circuit is completed by " the rising of the other end of the scale beam," and the bin valve is closed by the lever of the armature; at the same time the hopper valve is opened and allows " the weighed " grain to fall into a sack or other receptacle beneath," " the " hopper being thus lightened, rises and breaks the electric " circuit; an attendant then closes the hopper valve and opens " the bin valve (by means of a hand lever), when the operation " is repeated."

[Printed, 7*d*.]

A.D. 1857, June 12.—N° 1655.

BARSANTI, Eugène, and MATTEUCCI, Felix. — This invention is entitled " Improved apparatus for obtaining motive " power from gases ;" it " relates to the means of obtaining motive " power from the explosive force of a mixture of atmospheric air " and hydrogen, or any other inflammable gas. The explosion of " the mixed gases is effected by means of an electric spark applied " to the under part of a piston working in a cylinder."

According to the first method of carrying out this invention, only " the vacuum produced underneath the piston by the " explosion " is made available; in this case, therefore, " it is " simply atmospheric pressure acting upon the outer surface of " the working piston, which communicates the requisite motion " thereto in one direction, the return stroke being effected by the " piston rod." In this arrangement, besides the main piston, there is a smaller " counter piston," whose office " is to draw in " the charge of gas which is to be exploded, and also to clear" a small chamber (at the bottom of the main cylinder and of the same diameter) of the products of combustion. In this engine the main piston only exerts its power on the fly-wheel shaft during its descent by the pressure of the atmosphere as it acts on the

said fly-wheel shaft through the intervention of a rack (fixed to the piston rod), spur, and ratchet-wheel gear, which does not act during the raising of the piston by the "explosive force." The gas and air are admitted by a slide valve connected to the fly-wheel shaft by means of a cross-head, rods, and excentrics. The charge is fired by an "electric spark" from "a small cylindrical circuit "breaker," which rubs against a steel spring; this circuit breaker is kept in continual rotation by a band and pulleys in connection with the fly-wheel shaft. The electric circuit is only completed when the slide valve is at the extremity of its travel. "A Bunsen's "battery" and "De la Rive's multiplier" furnish the electric power. Two cylinders, operating alternately, are employed when this method is adopted.

"According to the second arrangement the force of the explosion "and the vacuum produced are both utilized, the one force being "made to act on one side of the piston, and the other force on "the opposite side. In this case the pistons and their cylinders "differ but slightly from those ordinarily employed in steam "engines as regards their construction and the mode of operating "them."

Locomotive engines on this principle consist of four cylinders, "one on each of two pairs of driving wheels, the main shafts "being made to drive these wheels by means of connecting rods "or gearing combined in such a manner as to change the direction "of rotation by means of clutches." The locomotive carries a "reservoir" of gas, between which and the feed pipe is a regulating apparatus, consisting of a small gasometer, and of a cylinder, piston, and slide valve; this arrangement supplies the gas to the working cylinders at an uniform pressure.

When the direct action of the explosion is used as a percussive force, the extremity of the piston rod is applied to the work; in this case the rotating shaft of the engine merely works "the supply "of the mixed gases to the cylinder, and the discharge therefrom "of the products of combustion."

[Printed, 11*d.*]

A.D. 1857, June 13.—N° 1662.

MARCH, Chapman.—(*Provisional Protection only.*) "Improvements in obtaining motive power."

"This invention relates to the obtainment of motive power for

"general purposes, from what may be termed purely natural
"sources. It is based upon the theory that the sun is the grand
"central power of repulsion and attraction of the universe,
"possessing alternated drifts or lines of repulsive and attractive
"movement, which lines act upon the earth in such manner as to
"cause the revolution of the latter. The special apparatus by
"means of which this power is taken advantage of, consists of a
"vertical first-motion shaft, carrying a horizontal wheel, round
"the periphery of which are disposed a set of thirty-two natural
"magnets, interpolated with corresponding pieces of steel, the
"whole series being dovetailed into each other to form a complete
"ring, the whole being held down by a ring of copper plates.

"This arrangement for obtaining a direct rotatory motion of the
"wheel is applicable for general purposes, but it is particularly
"useful in conjunction with the 'Improvements in propelling and
"'working ships or vessels,' for which Mr. Chapman March
"obtained a grant of British Letters Patent, on or about the ninth
"day of August, 1856. When applied to work in conjunction
"with the wind wheel described in the Specification of that
"Patent, the magnetic power wheel is disposed upon the wind
"wheel, a layer of caoutchouc being interposed between the two
"wheels. In crossing the equatorial lines where the sun is at
"times vertical, this arrangement will answer well, inasmuch as
"the wind wheel itself would be comparately useless from the
"great prevalence of calms in such situations."

[Printed, 3d.]

A.D. 1857, June 16.—N° 1678.

SMITH, WILLIAM (*a communication from Jean Marie Prost*).—
"Improvements in steam generators."

This invention relates to various methods of keeping the temperature of superheated steam constant by regulating the feed of water. This feed can either be altered by hand, attention having been called at the temperature requiring the alteration by means of an alarum, or the temperature may be made to regulate the feed by self-acting means. A condensing apparatus to be applied to generators of superheated steam, by the employment of which less water is required than is usually necessary, is also described and shown.

Two thermometrical apparatus are described and shown, in which the clockwork of the alarum is set free by mechanical

means; the second of these is made self-regulating by opposing more or less resistance to the opening of the overflow valve. In the third and fourth apparatus the expansion of a metallic rod by heat, and the alteration of form of compound blades of metal by the same means are respectively employed to affect the alarum and self-regulating apparatus.

In the fifth arrangement, electro-magnetic power is made available for the above objects. On the temperature being lowered to a certain point, or raised to another predetermined point, it completes a galvanic circuit (which includes one or other of two electro-magnets) by the deflection of the dial hand of a metallic thermometer against springs. When one electro-magnet is thus excited, it impels a weighted carriage nearer to the fulcrum of the overflow valve, thus increasing the temperature by decreasing the feed; when the other electro-magnet is excited, the loading of the valve decreases the temperature by increasing the feed. The carriage is impelled by a "pawl" on the armature working into the teeth of a rod connected with the carriage.

[Printed, 1*s.* 2*d.*]

A.D. 1857, June 16.—N° 1683.

EDWARDS, WILLIAM ALEXANDER.—(*Provisional Protection only.*) "This invention has for its object improvements in apparatus for separating iron and other matters from ores."

"For these purposes a cylinder of iron is employed, which is "constantly rendered magnetic by part of its length revolving "within a fixed coil of wire, the two ends of which are put in "connection with a galvanic battery. The pulverized ores and "other substances (from which it is desired to separate iron and "other matters attracted by magnets) are placed in a hopper, the "lower end of which is open, and admits the pulverized ore or "substances to flow freely as the cylinder revolves under the "hopper, by which means those parts of the pulverized ore or "substances which are attracted and adhere to the cylinder will "be carried round therewith, whilst those parts which are not "attracted will descend into a receiver below. And as the parts "of the surface of the cylinder, having iron and other matters "adhering thereto, come again under the hopper, a brush at its "lower end brushes off the adhering matters therefrom."

[Printed, 3*d.*]

A.D. 1857, June 16.—N° 1687.

DE BLAQUIERE, WILLIAM BARNARD.—"Improvements in "connecting the ends of submarine electric telegraph cables."

For this purpose, according to one method, a tube of metal is used, "having at each end a portion" "attached to the other part "by a hinge; the central portion of the tube is filled with gutta "percha, and has wires through it suitable for being connected to "and form part of the conducting wire of the telegraph cables;" screw nuts "screw on to the ends of the tube so as to hold down "the moveable portions," "and firmly nip the ends of the cables. "The junction is made in the following manner:—The ends of "the cables are brought together, and one of the nuts is slipped "over the end of each, then the ends of the cables are roughened "or grooved, and this may be done by compressing them between "suitable tools, so as to form a series of indentations round them "corresponding in form to indentations or grooves formed in the "ends of the tube" "and in the moveable parts." "When this "is done, the portions of the tube" which are covered by the hinged pieces "are filled in with gutta percha in a plastic state," then the hinged pieces "are shut down, and the screw nuts" "are screwed on, the junction is then complete."

According to another method, the tube "is made in two halves "or parts, and the wires in the middle of the tube are dispensed "with, so as to allow the conducting wires in the two cables to "be connected directly to each other. The two portions of the "tube" "are filled in round the ends of the cables with gutta "percha, or this may be omitted," "and they are held together "by screw nuts" "as before." "In place of grooving the ends "of the cables as above described, the ends of the covering wires "may be turned back over a metal ring."

"Cables of different sizes may be connected" "by the use of "this apparatus."

[Printed, 9d.]

A.D. 1857, June 17.—N° 1696.

MARQFOY, GUSTAVE.—"Improvements in actuating railway "signals."

A railway signal, consisting of a disc colored differently on each side, is actuated by clockwork, the said clockwork being liberated by electro-magnetic apparatus.

On an electric current being passed through the coils of an electro-magnet, its lever armature releases a spring; the bevel wheel of the clockwork which immediately communicates motion to the disc has two arms "pointing in opposite directions," one of which (in the normal condition of the apparatus) rests against a notch in the spring, therefore when the spring is released, the disc rotates until the other arm comes into the notch, viz., half a revolution. The lever armature acts upon the notched spring by means of a lever with two short arms and one long one; and during the semi-rotation of the disc, this lever is risen into such a position that the lever armature can prevent its deflecting the notched spring at the return of the said armature to its normal position by the breakage of the electric circuit; the said lever is raised by means of a pin wheel in the clockwork train.

On the axis of the disc an excentric is fixed, which gives motion to a lever "so as to complete electric currents, which are made to " act on ordinary needle instruments, the position of the needles " indicating in which position the disc is retained."

[Printed, 7*d.*]

A.D. 1857, June 23.—N° 1754.

ROUSSELOT, Joseph Scipion.—"An improved method of " obtaining motive power, and engine for applying the same."

"An oxyhydrogen flame," the gases for which are generated from water by a magneto-electric machine, is made to heat air; the expansion of the air gives "motion to pistons, and thence " through rods, cranks, etc., to any apparatus and for any purpose " required."

The magneto-electric machine employed has its horseshoe permanent magnets bolted "in a vertical position" on to a horizontal platform; the polar faces of the said magnets are thus enabled to be in the same plane, and arranged in the circumference of a circle, with the line joining the contrary poles of the same magnet radiating from the centre of the said circle. The armatures are arranged in an exactly similar manner to the permanent magnets, with the polar faces of their cores opposite to the polar faces of the magnets, but are fixed to a ring which is mounted on a vertical shaft carrying a commutator, by which the various induced electric currents are made available. From the commutator conducting

wires are led to a voltameter, in which the mixed gases are generated.

The general arrangement of the engine consists of "gasometers" attached to the voltameter, a "dilating vessel" in which the expansion of the air takes place, a "distributing box" to admit the dilated air to the "motive cylinder," and the "motive cylinder" itself, containing pistons which transmit the power of the engine to the machinery to be driven.

The action of the engine is as follows:—Before starting the engine, a "compressed air reservoir" and "the oxyhydrogen "reservoirs" are filled. After being expanded in the "dilating "vessel," the air passes to the "distributing box," thence into one of the "motive cylinders," producing motion of its piston; at the return stroke of the piston, the exhausted air is forced into a supply cylinder, "whence it is returned to the dilating vessel. "A little air is supplied by a small pump, to compensate for the "waste which may occur in the working of the engine." When the engine has been started in the manner just described, it drives the magneto-electric machine, and "proceeds without the "aid of the supplementary arrangements which are required to "start it."

Electricity is also employed to light the gas in the "dilating "vessel," which it does by "an electric spark" passing between "platinum wire points" "in front of a gas jet." In "the "distributing box" "an increase of dilatation" is given "to the "air by the action within it of a series of electric sparks, which "are made to pass between two copper rods terminated by "platinum points, from a battery or from the magneto-electric "machine."

A peculiarly-constructed valve closes "each of the several "openings" into the "motive cylinder."

To avoid explosions, the pipes connecting the "gasometers" with the "dilating vessel" are furnished with "wire gauze par-"titions," and "with a small cylinder filled with sand, through "which the gas can but the flame cannot pass."

[Printed, 9*d.*]

A.D. 1857, June 23.—N° 1755.

BROOMAN, RICHARD ARCHIBALD (*a communication*).—"An "improved method of engraving, and of copying figures, pat-

"terns, and other devices," in which electro-magnetic power is used.

In this invention a style is made to move over a pattern plate and a graver over a plate to be engraved, in an exactly similar manner, by means of suitably placed links and levers. When the style passes over conducting portions of the pattern plate, the graver is put into action by means of the armature to which it is attached, the electro-magnet of the said armature being included in the same electric circuit as the pattern plate and style.

In the arrangement shown in the Drawings, longitudinal rectilinear motion is given to the plates by means of levers and links moved by hand, the plates moving in guide frames. A similar plan, in connection with transverse slides, moves the tracer and graver across the plate. These motions combined enable the graver to trace parallel straight lines along its plate, except when the style passes over non-conducting portions of the pattern plates.

If the movements of the two plates and of the style and graver have been over like spaces, the engraved plate will be a facsimile of the pattern plate; but if the movements of these parts of the apparatus have been over unlike but proportional spaces, the engraved design will be enlarged or diminished; in the former case links without levers are used, and in the latter levers are used in connection with the links, the proportion between the designs being determined by the distance from the fulcrum at which the links are fixed.

The pattern plate is coated with varnish, and the design is drawn thereon "down to the metal."

The use of this invention "may also be extended to carving, "weaving, &c., &c."

[Printed, 6*d*.]

A.D. 1857, June 24.—N° 1767.

CHURCH, Jabez.—(*Provisional Protection only.*) "Improvements in the manufacture of artificial fuel."

"For these purposes sifted breeze is combined with coal or other "tar, to produce a cohering mass, which it" [is?] "put into a "retort and subjected to heat, and when the volatile products have "been driven off, the mass, whilst still kept heated, is subjected to "the action of streams of electricity."

[Printed, 3*d*.]

A.D. 1857, June 30.—N° 1830.

POLE, WILLIAM (*a communication from Charles Coles Adley*).—"Improved means for supporting" [electric?] "telegraph wires."

This invention consists of the use of a novel construction of metallic support for telegraph wires suspended in the air, in place of the wooden single posts ordinarily used.

Three iron bars or tubes are "arranged as struts, and welded or "rivetted together at their apex, thus forming a tripod." At the apex they are bound round with a wrought-iron collar, and a projecting piece to carry the insulator arms is formed; this projecting piece also "acts as a lightning conductor." A base piece to keep the struts equidistant is buried in the ground; this consists of an equilateral triangle of wrought or cast iron, having holes at its angles to which the rods or struts are fastened "by shoulders and "cottars."

In another modification described and shown, the three bars "are brought together for half the length of the tripod," fixed by a collar, and then spread out and kept equidistant by a suitable base piece.

The above arrangements are preferred, but any number of struts, from two and upwards, may be used.

[Printed, 6*d.*]

A.D. 1857, July 1.—N° 1835.

NEWTON, WILLIAM EDWARD (*a communication from Charles Nègre*).—"Improved processes for ornamenting metallic surfaces, "and for producing surfaces in intaglio or in relief for printing "purposes."

The processes may be described under the following heads, viz.:—

1st. "Producing, by means of electricity, direct deposits or "metallic images of gold, platinum, copper, &c., upon the surface "of another metal, such as steel, iron, copper, &c., partially covered "with a photographic varnish insulating and utilizing this super-"posed metal as a reserve or ground, for the purpose of attacking "and biting into the more oxidizable metal forming the founda-"tion or back, either by means of an acid or by electricity."

"To obtain these heliographic engravings, damaskened and "other ornamental surfaces," "negative reversed proofs, and

"ordinary positive and negative proofs" are employed. The photographic varnish consists of sensitized bitumen, gelatine, albumen, or gums. After having been acted on by light, those parts of the varnish "which have been protected from the action of the "light are then to be removed by means of a suitable solvent." A layer of metal is then electro-deposited "upon all parts of the "metal which have been laid bare by the solvent, and the photographic varnish (which has also acted as a reserve) is removed. If "a colored damaskened surface" is to be produced, those parts of the metal surface "not covered with the galvanic deposit of gold "or silver" are shaded by the formation of an oxide or sulphuret. If it is required to produce an engraved plate for printing, those parts of the design not protected by the galvanic deposit (of gold or silver, for instance,) are bitten into; if it is electro-etched, it must be "immersed as an anode in a neutral solution of a soluble salt "of that metal."

After the action of the solvent upon the photographic varnish, the plate may be electro-coated with copper, and the deposit afterwards detached from the plate; this gives an engraving in relief if "an ordinary negative" is printed through "on the layer of "bitumen."

2nd. "Effecting by means of electricity direct metallic deposits "upon photographic images obtained by means of a metallic "salt."

No bituminous or organic photographic varnish is employed, but "the metal is reduced in the parts of the sensitive layer acted upon "by the light." This reduction takes place by means of gallic acid and nitrate of silver or by phosphorus. An electro-deposit of copper is then made upon all the parts thus metallized. "If the "picture operated upon is a reversed negative, it is necessary, as "soon as the first deposit has acquired a certain consistence, to "spread upon the whole surface of the picture obtained upon "glass, or attached by means of varnish to any plain surface, a "close or compact layer of copper filings, which by allowing of a "deposit upon the whole surface of the picture will by its grain "give a dark tint to the impression. The portions in contact "with the image or picture will furnish the whites by thin polish. "When the deposit is considered sufficient it may be detached." Many details are set forth in this Specification.

[Printed, 5*d*.]

A.D. 1857, July 8.—N° 1902.

CUMMINS, NICHOLAS MARSHALL (*a communication from Lieutenant-Colonel John Swate Cummins*).—" Improved means for " indicating the proximity of icebergs."

" The object of this invention is to indicate to navigators the " proximity of floating icebergs, when, either from the foggy state " of the weather or from darkness, such objects are not dis- " cernible."

The fact of the temperature of the surrounding sea being reduced by " the presence of icebergs " is used " to attain the required " indication." There is fitted " in the fore part of the ship, below " the line of flotation," " a trumpet-mouth pipe which projects " downwards into the water, and is intended to receive water from " near the keel of the vessel, and discharge it into the ship below " the load water line upon the face of a thermometer. By this " means the temperature of the water will be continually indicated " on the thermometer, and if desired the fall of the column of " mercury can be caused to set an alarum in action and attract " the attention of the master of the ship."

According to one method of liberating an alarum clockwork, set forth in the Complete Specification, a metal bar or rod acts, by its contraction, on the detent lever, when the temperature of the water sinks to a dangerous point.

According to a second method, a mercurial thermometer usually completes an electric circuit, thus maintaining the detent armature of an electro-magnet in such a position as to prevent an alarum from acting. When, however, the temperature becomes lowered to a dangerous amount, the armature falls away from the electro-magnet and releases the alarum clockwork.

[Printed, 10*d*.]

A.D. 1857, July 8.—N° 1903.

MOORE, ROBERT.—(*Provisional Protection only.*) " Improve- " ments applicable to navigable vessels, and the propelling thereof," consisting of:—

1st. " Certain strengthenings in the structure " of vessels.

2nd. " Appliances for the more advantageous developement and " economy of steam when used as a motive power;" raising and lowering the screw, &c.

3rd. "For the detection of local attraction, & consequently to "facilitate the correction of the magnetic deviation," "a closed "cylindrical or other vessel of suitable dimensions and form" is suspended "in a similar way to compasses, or in any more con- "venient manner. The upper and lower ends may be of glass "so as to render it transparent, and allow of its being illuminated "from below. This box or vessel is filled or partly filled with "spirits of wine or other suitable fluid, and suspended on this "fluid" is placed "a combination of magnets, consisting of three "or more, secured to buoyant frames, which acting both com- "binedly & in some respects independently, will, from the mean "of several simultaneous observations upon certain well-known "principles of magnetic or electro-magnetic influences, furnish a "correction, or an estimate very nearly correct, of the magnetic "deviations caused by local attraction."

[Printed, 8*d*.]

A.D. 1857, July 20.—N° 1998.

HOLMES, FREDERICK HALE.—"Improvements in magneto- "electric and electro-magnetic machines," consisting of:—

1st. "Making the helices of magneto-electric machines with "movable iron cores, which cores can be withdrawn and replaced "with facility."

For this purpose the core is made to screw "into one of the two "face plates" "of the helix, the other end of the core being "formed with a projecting shoulder or collar," which tightens the said core against the other "face plate," and at the same time tightens the face plates against the coil.

2nd. Making the divisions of cylindrical inlaid commutators "of "a curved or indented form, or in broken lines, so that each of "the contact rollers, in passing over any one of the divisions so "formed, is always in contact with the commutator, whilst at the "same time the curved or indented spaces between the divided "portions of the commutator are made sufficiently wide to pre- "vent dust or other foreign substances lodging permanently "therein, and thereby forming a conducting medium between "those parts that are required to be insulated from each other."

3rd. A mode of obtaining a "'compound current' from a "magneto-electric machine." The helices are arranged "with

" regard to the poles of the magnets, and the commutators with " regard to each other, in such a manner that out of two or more " interrupted currents of electricity, one or more constant and " uninterrupted or 'compound' currents are produced."

The poles of the magnets are arranged "in a circle and at equal " distances asunder," and the helices are disposed "in a similar " manner," the number of the helices being "a multiple of the " number of poles of the magnets."

"A separate and distinct commutator" is employed "for each " series of helices, that is to say, supposing the number of helices " to be double the number of poles," two commutators are arranged "in such a manner that the rollers shall pass over the " divisions in each commutator at the instant when the whole of " the helices in communication with such commutator are on the " 'dead point' of the current, that is to say, at the instant when " the current is about to flow through the series of helices in an " opposite direction. As there are twice as many helices as poles, " it follows that when one series are on the 'dead point,' the other " series will be in the condition of maximum electric force."

Therefore, by suitably connecting the two conducting wires of one commutator with those of the other commutator, "a com- " pound current will be the result, which has no dead point."

"A compound current of this description, produced from a " double series of helices and two commutators, will be found " most advantageous in the production of the electric light."

[Printed, 6d.]

A.D. 1857, July 30.—N° 2074.

COULSON, Samuel.—(*Provisional Protection only.*) "This " invention has for its object improvements in preparing solutions " for coating with aluminium" [aluminum?].

"For this purpose cyanide" [a cyanide?] "is used, and the " preparation is by preference produced as follows:—Into a " solution of cyanide of potassium in water is introduced a " plate or anode of aluminium, attached to the positive pole of a " galvanic battery, and a plate of copper or other suitable anode" [cathode?] "is attached to the negative pole of the battery, the " solution of such latter pole being separated by a diaphragm. " By this means the aluminium will be dissolved, and a proper

"solution thereby prepared, which is to be used in depositing by "electric means, as like solutions of silver and of gold are now "deposited."

[Printed, 3d.]

A.D. 1857, July 30.—N° 2075.

McKINLEY, William, and WALKER, Robert.—(*Provisional Protection only.*) "This invention has for its object an "improvement in the manufacture of moulds for the forming of "the soles of boots and shoes."

"For this purpose a complete boot or shoe is produced, having "the size and form of sole desired, the sole being of gutta percha; "and the improvement consists in preparing and using an electro-"type cast in the making of a mould, for the production of like "sizes and forms of soles, of gutta percha or compounds thereof. "The 'upper' of such boot or shoe is prepared so as not to be "injured by the acid used in the bath used to deposit the required "electrotype cast. The sole and a small portion of the 'upper' "is to be made conductive and placed in the solution, and the "boot or shoe, with a last therein, is put into the solution and in "connection with a galvanic battery, so as to have a metal coating "(by preference copper) deposited thereon, which is removed and "divided into two parts, and fixed by soldering in an iron or "suitable frame or form."

[Printed, 3d.]

A.D. 1857, August 13.—N° 2156.

COLLINGRIDGE, Henry.—(*Provisional Protection only.*) "Improvements in separating metallic substances from coffee, "and in the apparatus employed for the purpose."

This invention "consists in separating metallic substances from "coffee by means of magnets or electro-magnets, which hold the "metallic substances while the coffee moves past them; and the "apparatus" which is employed "for the purpose consists of an "inclined trough or slide, down which the coffee is allowed to "fall, and to the surface of which is applied a number of magnets "or electro-magnets, which attract to them the metallic substances, "and retain them, while the coffee falls clear of them into a suit-"able receptacle."

[Printed, 3d.]

A.D. 1857, August 19.—Nº 2198.

WALL, ARTHUR.—"Improvements in coating metallic sur-"faces."

The processes comprising this invention are principally employed to preserve "the bottoms of iron ships or other vessels," they may, however, be used "for the preservation of all iron surfaces sub-"merged in sea water."

The first-described process in the Complete Specification consists of applying a chemically-prepared paste or paint to the surface to be protected; over this paint a "top coating" of a mercurial compound is used.

The second process relates to the deposition of metals held in solution. In this process "the solution may be placed in a tank "and the metal be immersed in it, *and electric currents applied*, "if required." To make the depositing solution, a concentrated acid solution of a sulphate of the metal to be deposited is dissolved in naptha and pure "pyrolignous" [pyroligneous?] "spirit," sulphuric acid is added, and the whole is "well stirred and shaken." To clean the metallic surface prior to depositing the metal, a cream of diluted "muriatic" acid and "gypsum or chalk" is painted over the metal and allowed "to remain on the iron till dry, and "till the coating assumes a red rusty appearance." After the metal is deposited, the surface is washed with a weak solution of potash and wiped dry.

In reference to the second process, in the Provisional Specification it is stated that "a pile (galvanic)" is formed "by means of a "friable earth or earths (chalk, for instance,) and the metal to be "operated upon;" "the solution is made from the oxides of zinc, "copper, or other metallic oxide by means of acid (sulphuric or "muriatic), it is then precipitated and redissolved in naptha and "pyroligenous" [pyroligneous?] "acid."

[Printed, 4*d*.]

A.D. 1857, August 19.—Nº 2200.

BALESTRINI, PIER ALBERTO.—"A new method of and appa-"ratus for sounding at sea and in other waters."

This "method consists in ascertaining depths at sea and in other "waters by the agency of electricity, applied through and in con-"junction with a plummet or sounding apparatus, constructed

"and connected with wires leading to a battery, in such manner "that upon the plummet reaching the bottom, a part of the apparatus shall rise, fall, or otherwise move, so as to make or break "the electric current or circuit, and cause the ringing of a bell, or "give motion to any other electric indicator. Upon the indication, ringing, or other signal being observed by the man heaving "the apparatus, he will examine his line and read off the depth "at which the sounding has been taken."

The Drawing exhibits an apparatus in which the signal is given by the breakage of the electric circuit. A piston fastened to the sounding line is free to move in a cylinder attached to the plummet when the plummet reaches the bottom. The piston has the insulated circuit wires passing through a central hole, and connected to rings in its wooden prolongation; springs bearing against these rings ordinarily complete the circuit, but when the plummet reaches the bottom they are removed from contact with the lower ring and the circuit is broken. The body of the instrument is filled with oil, whose escape is prevented by a small piston free to move in a cylindrical aperture at the bottom of the plummet cylinder; this arrangement, in connection with suitably placed apertures, allows the internal and external pressures to be equalized, and permits of the displacement of water caused by the descent of the large piston.

[Printed, 6*d.*]

A.D. 1857, August 19.—N° 2208.

NAPIER, JAMES MURDOCH.—(*Letters Patent void; no Complete Specification filed.*) "Improvements in apparatus for paying-out "submarine" [electric?] "telegraph cables."

"The invention consists in means of applying, sustaining, and "guiding cables to aid in the paying-out of telegraph cables." Either an "endless sustaining cable" "with holders at fixed "distances," or a fixed cable with a weight at its lower end, is used to sustain "the weight of the telegraph cable as far down as "may be required." The telegraph cable may pass through a "friction apparatus" attached to the lower end of the sustaining cable, "a dip weight" being used "to depress this apparatus, and "direct the fall of the telegraph cable." Apparatus may be attached to the lower end of the sustaining cable, by which "the "paying-out of the telegraph cable will give motion to a screw

"ejecting pump, or other propelling apparatus forming part of the "apparatus, which is thus moved forward under water in the "direction of the ship's course, thus assisting to lay the telegraph "cable in a direct line;" "a dip weight" may be used with this apparatus, or the weight of the apparatus may be increased. "In "order to prevent the loss of the cable," it is secured "that the "breaking point of the cable shall be on board the ship by passing "it over a small pulley; the instant the strain is taken off this "pulley by the breaking of the cable a mechanical action takes "place, which stimulates a powerful gripping apparatus placed in "advance of the small pulley, and which is fixed to a buoy; as "soon as the retiring cable is seized, it tears away the buoy from "the ship. The buoy is made of sufficient size to float and sustain "the end of the cable. The break apparatus used for controlling "the running-out of the telegraph cable is acted on and regulated "by the flow of water or other fluid through a passage capable of "being regulated in its dimensions, by which greater regularity "may be obtained."

[Printed, 3*d*.]

A.D. 1857, August 20.—N° 2209.

BROOKE, Robert Lawrence.—(*Provisional Protection only.*) "An improved method for discharging, 'paying out,' and sub-"merging electric telegraph cables, wires, or ropes or such like "articles from ships or vessels of any description."

This improvement "consists in placing a well or funnel with "rollers at the top and bottom of same, at or close abaft the "midship section or any other part below the water line of any "vessel employed in laying cables, ropes, or wires or such like "articles of any construction or material."

[Printed, 3*d*.]

A.D. 1857, August 25.—N° 2245.

HEMMING, George Wirgman.—"Improvements in apparatus "employed in delivering submarine" [electric?] "telegraph "cables from ships."

The cable is passed "over, under, round, or through one or "more moveable supports, wheels, drums, sheaves, rings, tubes, "or other equivalent contrivances, so arranged that the length of "cable consumed in passing over, under, round, or through such

"moveable supports, wheels, sheaves, drums, rings, tubes, or other
"equivalent contrivances, either alone or in conjunction with
"any one or more fixed supports, wheels, drums, sheaves, rings,
"tubes, or other equivalent contrivances may be caused to vary
"according to the strain upon the cable on the motion of the
"ship, or otherwise, as may be desired, by which means the rate of
"delivery of the cable from the ship may be made to accomo-
"date itself to the irregular motion of the ship, and to counteract
"the alternating increase and decrease of the strain occasioned by
"the pitching or other irregular motion of the ship, especially in
"bad weather.

"The motion of any moveable support or supports, &c., may be
"regulated either by machinery worked by hand, or by machinery
"so adjusted as to be worked by the motion of the ship, or
"simply by the action of the varying strain of the cable itself
"upon the moveable supports, &c., supported or retained by
"means of counteracting springs or counterpoises, or by a com-
"bination of these three methods."

The Drawings show the cable passing round fixed and moveable sheaves alternately, the bearings of the moveable sheaves being capable of motion in vertical guides; a chain connected to the said bearings is fixed to the periphery of a wheel, whose axis carries another chain, the free end of this second chain being connected to the piston of an air cylinder. The air cylinder is connected to an air-tight reservoir, from which the air is exhausted; by this arrangement any irregularities in the strain upon the cable are compensated, cable being given off or gathered up accordingly.

[Printed, 10*d.*]

A.D. 1857, August 25.—N° 2249.

RONALD, James.—"Improvements in laying or depositing
"submarine" [electric ?] "telegraph cables."

"This invention consists in surrounding the telegraph wire or
"wires forming the telegraph cable with a cable or a strand or
"strands formed of a material or materials of sufficient buoyancy
"to support or float the wire or wires to which they are connected
"for a limited time and extent."

"The material or materials proposed to be used for surrounding
"and supporting the telegraph wire or wires, or, in other words

" to reduce the specific gravity of the cable, are cocoa fibre, or " coir manilla, or other like material or materials, whose specific " gravity are sufficiently light to support themselves and the " telegraph wire or wires to which they are attached, until such " times as they absorb sufficient moisture to increase their specific " gravity to cause them to lose their buoyant properties, and " thereby allowing the cable or strand or strands in combination " with which they are to sink to the bottom."

"If preferred, the wire or wires may be connected with the cable " externally, in place of forming the heart or core thereof."

[Printed, 3d.]

A.D. 1857, August 31.—N° 2287.

GISBORNE, Lionel, and FORDE, Henry Charles.—" Improvements in apparatus for paying out electric telegraph " cables."

" The cable is passed over a pulley which is carried by an arm " suspended from a universal joint; and it has also another " universal joint near the pulley; thus the arm can oscillate in all " directions, and the pulley can follow the succeeding coils in " which the cable is laid in the ship or vessel. The cable next " passes under a stationary pulley and then over a drum (which " is governed by a break), around which it takes several turns; " the cable then descends under another pulley which is " weighted, and has a quantity of chain attached to it, and when " the strain comes on the cable it draws it more and more nearly " into a straight line, lifting at the same time the weighte " pulley, and so becoming subjected to a continually increasing " weight. The weighted pulley in its rising and falling is guided " by two uprights, at the upper part of which there is a spring or " buffing apparatus to counteract any sudden rising of the pulley. " The cable lastly passes over two guiding pulleys to the stern of " the ship or vessel. On the upper coils of the cable are placed " numerous spherical weights which cover the whole upper " surface of the coils of the cable, and they at all times prevent " the cable as it runs out from drawing up portions of the coil " with it."

The Drawings show the telegraph cable descending to the chain-bearing pulley between two other pulleys, and not proceeding

immediately from the brake drum to the chain-bearing pulley, as stated above. It also appears that when the strain of the telegraph cable draws up the chain-bearing pulley, the weight of the chains acting (through levers) on the brakes, permits the cable to run out more freely; when the chain-bearing pulley descends, the brakes are by this means "applied more and more strongly."

[Printed, 10*d.*]

A.D. 1857, September 1.—N° 2297.

GRENET, Eugene, and VAVIN, Alexis.—(*Provisional Protection only.*) "An improved electro-magnetic machine."

This invention consists of an electro-magnetic engine, "which "is so constructed as to provide, first, for the diminution of the "number and the increase of the size of the magnets employed in "such machines; secondly, for the employment of wires of large "gauge in the coils; thirdly, for the direct action of electro-"magnets upon one another; fourthly, for the utilisation of the "magnetic force, until the contact of the magnets take place, and "for the avoidance of shocks in the machine; and, fifthly, for the "prevention of the destructive action of the spark produced at the "points where contact is successively made and broken."

The polar extremities of upright fixed electro-magnets "pass "through a plate or table of bronze, which is flush with them, "and perfectly smooth and plain." A set of electro-magnets, with their "polar extremities curved," "rock or roll upon the "bronze table and the lower magnets;" motion is communicated from the rocking or rolling electro-magnets to a crank shaft by means of connecting rods attached to each of the upper electro-magnets, thereby giving the crank shaft continuous rotation.

The electric current is "transferred successively" from one electro-magnet to the other "by means of conducting rods or "plungers alternately inserted in receivers containing mercury, "and withdrawn therefrom; motion being given to such rods or "plungers by means of cams or elliptical projections upon the "central shaft: water, or other non-conducting liquid, is placed "in the receivers above the mercury for the purpose of extin-"guishing the spark which results from the rupture of the "galvanic current."

[Printed, 3*d.*]

A.D. 1857, September 5.—N° 2327.

FONTAINEMOREAU, PETER ARMAND le Comte de (*a communication*).—"An improved timekeeper dial, shewing the exact "time in different countries."

This invention consists in "the forming of a universal comparative dial, *suitable for electric telegraphs*, railways, and clocks "in general, by means of circles or horizontal lines divided into "hours, and arranged according to the difference of longitude, for "shewing the comparative time of places or towns thereon."

In one plan there are as many concentric circles as towns, and a single hand working from the centre of the dial indicates the comparative time.

When "there is not more than an hour's difference" between the extreme towns, one circle may be "divided into twelve hours, "and the others into sixty minutes;" "two hands, as usual," may be used in this case.

"To avoid increasing the size of the dial to a too great extent," only one divided circle may be used, there must then be as many hands as towns.

"If horizontal lines be substituted for circles, a "table may be "formed" based upon the same principles of construction as the above-described dials. It is proposed to use a plumb line in connection with this table.

[Printed, 6*d*.]

A.D. 1857, September 8.—N° 2341.

SHARPE, BENJAMIN.—"Improvements in electric telegraph "cables, and in the apparatus used for paying out such cables."

"In the manufacture of electric telegraph cables," "the exterior "protecting wires or strands are arranged longitudinally of the "core, and are secured around it by a fine wire, which passes "round and round the cable, or alternately over and under the "longitudinal wires;" these exterior protecting wires are preferred to be of copper. In the arrangement just described, strips of metal or a single strip of metal may enclose the "telegraphic core," or a coating of copper may be electro-deposited on the "telegraphic "core."

"In order to reduce the specific gravity of telegraphic cables," the cable is enclosed "in a flexible and air-tight tubular case, some-

"what larger in diameter than the cable," and this is secured "to "the cable by binding it round at intervals, and in this way a "series of air chambers are formed around the cable which tend "to support it when in the water."

"In paying out telegraphic cables, in order to give greater "uniformity to the strain on the cable," it passes over the stern of the vessel by means of a pulley mounted so as to lower as the strain increases. For this purpose the pulley is suspended from "sheers" by blocks and a rope, the other end of the rope being attached to a counterpoise, "or to a lever on which the counter-"poise is mounted." "As the counterpoise rises and falls it by "means of ropes or otherwise acts upon the break apparatus, so "that the resistance offered by the break is increased as the counter-"poise falls and diminished as it rises."

To facilitate the clearing of fouls or kinks in the cable, it is passed from end to end of the ship "by means of blocks," or led up to a block suspended between the masts; "while this length is "running out time is allowed for clearing the cable."

"In order to prevent the end being lost in the event of the cable "suddenly parting," a "stopper," to which a long length of rope is attached, immediately catches hold of the cable and is drawn overboard by it. The cable is recovered by hauling in the rope.

[Printed, 10*d*.]

A.D. 1857, September 9.—N° 2346.

HOGA, Stanislas.—(*Provisional Protection only.*) "Improve-"ments in apparatus for generating electricity, and for transmitting "electric currents from place to place."

The "apparatus for generating electricity" consists of a hydro-electric machine, in the boiler of which a mixture of mercury and sulphuret of mercury is used instead of water.

"The apparatus by which two stations can be brought into "electric communication consists of two such boilers." Near each boiler is placed an insulated shallow vase filled with water; at one station "the positive electricity of the jets of mercurial "vapor" is conveyed "to the water in the vase, to be there dis-"sipated in the air," thus leaving for use "the negative electricity "of the boiler;" at the other station "a metallic connection con-"veys the negative electricity from the boiler to the vase of water, "leaving for use the positive electricity of the jets."

At each station two large zinc plates are "placed vertically in "the ground" at a certain depth and distance apart. The plates of each pair are parallel to each other and "to the corresponding "pair of plates at the other station. The upper ends of each pair "of plates are connected by wire, which passes through a delicate "galvanometer, so that the passage of electricity from one plate "to the other is indicated by the motion of the magnetic needle." When the opposite kinds of electricity respectively at each station are in connection with the earth, they run together and pass "by "the metallic wire of the two plates and the galvanometer;" if, however, the electricity from only one station is in connection with the earth, the galvanometer at that station is not affected, but the electricity is "dissipated in the neutral mass of the earth."

If the electricity is so abundantly produced at the receiving station that its needle is affected by "the electricity which passes "from the first plate to the ground without the co-operation of "the electricity of the distant place," a third plate in the ground is connected with the second plate "by a wire passing through a "galvanometer;" there is no connection "between the two first "plates." "When the electricity at the distant place" passes to the ground, "a horizontal current is formed in a line passing the "second and third plate," thus affecting "the needle of the "galvanometer."

[Printed, 3*d.*]

A.D. 1857, September 11.—Nº 2366.

SILVER, Thomas.—(*Provisional Protection only.*) "Machinery "or apparatus for regulating or governing the paying-out or "delivery and laying down of submarine or oceanic" [electric?] "telegraph cables, parts of which are also applicable for taking and "recording soundings and for other purposes," consisting of:—

1st. "A top and bottom piece of framework, each fitted with "groved" [grooved?] "pulleys, sheaves, or drums." The bottom framing is fixed, and the upper framing is "capable of "descending or approximating the other frame" to an extent proportioned to the strain of the cable, the frames being held at a suitable distance apart by springs and guides. The cable is passed alternately under and over the several pulleys, "and finally out of "the machine over the stern" "of the ship into the sea." There is consequently "a considerable length of cable stored within such

" machine and behind the break apparatus," so as to be "available " at any moment to meet any sudden variation in the demand for " quantity" of cable.

2nd. " An atmospheric regulator or fly-govenor" [fly-governor?] " revolving at a suitably high speed, and connected by a suitable " train of gearing to the first pulley." The resistance of the fly to the atmosphere may be altered by hand to suit the varying circumstances of the delivery of the cable. A self-acting arrangement consists of a tube varying in its position according to the angle of the cable's entry into the sea; this tube alters the angle of the vanes of the fly by its motion, so as to suitably regulate the delivery of the cable.

3rd. " An index, indicator dial, or other weight measuring and " recording apparatus connected in any suitable manner and " position with the moveable framing." This apparatus acts "in " the manner of a steam engine indicator."

[Printed, 3d.]

A.D. 1857, September 17.—N° 2411.

PULVERMACHER, Isac Louis.—" Improvements in apparatuses for creating electric currents, chiefly for medical purposes."

" An improved arrangement of electro-magnetic apparatus for " producing induced currents." The coil contains a core of iron wires, which are continued so as to project a certain distance from one end of the said coil; the projecting portions of the iron wires are bent up "in such manner as to enfold or enclose the coil," " the whole of the ends or poles of the wires being brought into " the same plane." A bar or plate, placed above these ends or poles, acts as a keeper to the arrangement, and breaks and makes contact of the coil terminals, thereby inducing a secondary current when a battery is suitably connected to the coil; the bar or plate is made to move or vibrate parallel to itself by means of guides and "spiral" [helical?] springs.

" A constant and energetic current" may be produced "in bat- " teries, without the employment of any acid," by a galvanic combination of zinc and carbon, excited by "a solution of " bichromate of potass, bisulphate of potass, and sea salt."

" Portable flexible batteries." Copper and zinc wires are wound alternately round a band of perforated gutta percha, "and at in- " tervals of, say, half an inch," such copper and zinc wires are

made "into separate elements," the whole are united "into one "battery" by suitable "clasps" and "hinges." In another construction a warp of fibrous material is combined "with a weft of "relatively positive and negative metals;" such batteries are supplied "with an exciting liquid by the capillary action of the "said warp."

Batteries "acting by filtration." "The copper wire is spirally" [helically?] wound round "a conical tube of perforated insulating "material," over the copper wire is a membrane or diaphragm on which the zinc wire is wound. The exciting liquid penetrates from the conical supply tube to the copper through the diaphragm to the zinc.

Other constructions of portable flexible batteries. Metal leaf or foil or metallic filings or powder may be caused to adhere to paper, leather, or other similar material; this may be done with an adhesive composition printed or otherwise placed on the paper; "a thermo-electric pile" constructed in this manner is described and shown. Another method of construction consists of "inserting plates of metal between the divided portions of other "plates of metal, with an insulating material between them;" this arrangement may be combined with the principle of capillary supply herein-before mentioned, thus affording free access of the air to the metals.

An "interruptor" "for making and breaking electric circuits." A cup of caoutchouc has concentric rings of metal sunk in it; a metallic ball, by rolling in the interior of the cup, touches momentarily two of the rings at once, and thus makes and breaks the circuit.

[Printed, 1s. 4d.]

A.D. 1857, September 18.—N° 2414.

SMITH, WILLIAM (*a communication from Mons. Pierre Elie Gaiffe*).—"A novel machine or apparatus for engraving the metallic surfaces of printing rollers or cylinders," in which electro-magnetic power is used.

The action of the machine is as follows:—

A pattern "mullar" or cylinder is made to rotate under a tracing point with velocity proportionate to that of the cylinder to be engraved, which rotates in front of an engraving tool. The tracing point and engraving tool have also proportional longitudinal mo-

ions from the same wheelwork that rotates the cylinders. The pattern cylinder has the pattern drawn upon it in a non-conducting varnish, and the tool-holder is furnished with an electro-magnet. On the passage of the tracing point over the conducting portions of the pattern cylinder the electro-magnet holds back the engraving tool, but when the varnished pattern breaks the circuit a spring forces the tool to engrave the cylinder. Thus, on the machine being put into action, figures are cut by the engraving tool proportionate to those passed over by the tracing point; the relative sizes of the figures depend upon the wheelwork and screw gear concerned in transmitting and giving the requisite motions.

"If the pattern is composed of several shades, the darkest ones "are first painted and engraved, and afterwards the lighter ones."

A to-and-fro motion is given to the tool-holder by an excentric "working at a high speed." The undulatory lines thus produced "retain the colour used for printing," and give "to the print "quite a different and better appearance."

This invention "can be applied to any engraving machine con- "structed upon the pantographic principle."

[Printed, 1*s*. 7*d*.]

A.D. 1857, September 18.—N° 2415.

BURLEIGH, Benjamin.—(*Provisional Protection only.*) "Im- "provements in the mode of laying submarine" [electric?] "telegraphs."

In order to remove "the difficulties usually experienced in laying "submarine telegraphs consequent upon the strain to which the "cable is exposed," "a number of water-tight buoys or floats of "any required form" are constructed "of india-rubber, gutta "percha, copper-plate, tin-plate, or any other suitable material, "elastic or non-elastic," and it is proposed to affix these floats or buoys "to the cable either before or during the process of paying "out, at such intervals or distances apart that each float shall "afford support to a given portion of the cable, so as to relieve the "dead weight on the end attached to the vessel, thus affording "greater facilities for laying the cable and lessening the risk of "breakage. This process will also greatly facilitate the operation "of raising a sunken cable.

"In lieu of the buoys described, floats of cork or funnel-shaped "plates of metal may be used for retarding the sinking of the cable."

The following mode of "affixing the buoys or floats to the "cable" is preferred:—"To each float a pair of clips or jaws is "attached; the jaws being opened by pressure are passed round "the cable during the process of paying out, and are made to "clip or embrace it firmly either by means of a spring, screw, or "other mechanical action, thus fixing the floats firmly to the "cable, retarding its sudden descent into the water; and each "float being made to bear a certain proportion of the entire weight "greatly relieves the strain upon the cable."

[Printed, 3d.]

A.D. 1857, September 18.—N° 2428.

DERING, GEORGE EDWARD.—"Improvements in laying down "electric telegraph cables, in obtaining soundings, and in ascertaining the position of and raising submerged electric telegraph "cables and other bodies."

The "improvements in the laying down of submarine telegraph "cables consist as follows:"—

1st. "The use of self-acting 'governors,' to regulate or adjust "the breaks or other controlling power to the rate at which the "cable is running out." "The governor" is "constructed upon "like principles to the governor of a steam engine and" is put in "motion by the descending force of the cable."

2nd. "The use of" "a 'safety governor'" upon the same principles but "acting conversely to the last, and so arranged "as to operate only when the cable is subjected to undue strain, "and would be in danger of parting, and in such case to moderate "or withdraw the breaks or other controlling power."

3rd. "The use of sheaves or other supports for the cable" "to pass wholly or partly around before leaving the vessel, "so held in position by springs or otherwise that they will "gradually yield as the strain upon the cable" "increases, "and in yielding increase the force of the break or other "controlling power, or, if desirable, increase it up to a certain "strain, and moderate or withdraw it if the strain approach a "dangerous degree."

4th. "To accommodate the action of the breaks" "to the "pitching of the vessel in a heavy sea" weights are employed; the said weights are "ready to act in opposition to springs or

" other suitable force actuating or allowing to act the breaks or " other controlling power, but of rather inferior force." The momentum acquired by the weights when the vessel drops with the water, enables them to counteract the springs on the vessel reaching her lowest position, the brakes are thus relieved; when the vessel is rising with the water, the inertia of the weights enables the brakes to be moderated and the strain on the cable prevented.

5th. "The use of fans or other resisting surfaces" moving in air, gases, water, or other fluids or liquids, and "put in motion " by the descending force of the cable, to regulate its delivery " into the water;" automatic or other means are "provided for " varying the area, or angle, or velocity of the resisting surfaces." " Pumps tending to produce a vacuum" may be similarly employed in some cases.

6th. "The use of revolving drums of a conical or equivalent " form around which to pass the cable, breaks or other controlling " power being applied to the drums, the peculiar form of which " admits of the cable" "making several convolutions without " the risk of one coil overriding another."

7th. The use of "friction breaks" "pressing directly upon the " cable itself, or against which it is pressed, to moderate or stop " its descent into the water."

8th. "The use of self-acting bells or other alarms to give " notice if the cable is subjected to undue strain;" these bells may be actuated "by the moveable sheaves above described," or other suitable arrangements.

9th. "The use of parachutes or equivalent arrangements, having " in at least one direction but little resisting vertical surface in " proportion to the horizontal area, and buoys similarly shaped, " for the purpose of moderating the descent of the cable, whilst " presenting but a small amount of surface to the influence of " horizontal currents; and the use of surfaces set at suitable " angles to act as rudders to regulate and guide the descent of " the cable, particularly when subject to horizontal currents."

The "methods of ascertaining the position of and raising tele- " graph cables or other submerged bodies" are as follows:—

1st. "The employment of conductors for electrical communi- " cation, or pipes for pneumatic or hydraulic communication " between the grapnel or other instrument employed and the ship

" or other vessel, and so constructing the former that when it " comes in contact with the object sought, a signal shall be com-" municated to the ship." In some cases like means are employed "to indicate from below the amount of strain upon the " cable, or to give notice when it exceeds a certain degree."

2nd. "The formation of the cable, by which the grapnels are " dragged, of gradually increasing size or strength from the grap-" nel end; they may be of rope or chain of any description, or of " other construction, but steel wire rope is preferred."

3rd. "The use of anchor-like grapnels, having the 'stock' or " its equivalent placed behind the 'arms.'"

4th. "The use of grapnels having jaw-like, and by preference " spiked or barbed apertures, of such form that a cable will be " held firmly therein; or of such form as readily to wholly or " partially sever a cable, retaining hold of one part thereof; or of " such form as readily to wholly or partially sever a cable without " retaining hold of either part."

5th. "The use of grapnels of the various kinds just described, " with the addition of means of closing the 'jaws' upon an object " entering them."

The improvements "in obtaining soundings for telegraphic or " other purposes, especially in deep water," consist in "the use " of an apparatus constructed upon principles analogous to the " well known 'aneroid barometer,' the instrument being self-" registering and calculated to indicate the pressure of the column " of water."

[Printed, 4d.]

A.D. 1857, September 21.—N° 2445.

SCHAUB, George.—"A new or improved manufacture of " rollers or cylinders with patterns or designs thereon for printing " fabrics and other materials," "the said rollers or cylinders " having designs on them either sunken or in relief, and made by " the process of electro-deposition."

A cylinder of separate metallic pieces is composed or built up upon a wooden cylinder, "which said metallic pieces surround " and enclose the said inner solid cylinder of wood," and carry " on their ends the pattern or design." "The several metallic " pieces or sections being fastened together so as to form a hollow

"cylinder," the inner wooden cylinder is withdrawn and a thick layer of copper is electro-deposited "in the inside of the hollow "metallic cylinder;" the hollow copper cylinder thus made is then liberated by separating the metallic pieces, and is fitted on the spindle on which it has to work by means of a lining of sheet iron and "Keene's" or other cement.

The "metallic pieces" are cast "after the manner of casting "printing type."

According to another method, the hollow cylinder "in which "the copper deposit is effected" is constructed "of small pieces "resembling printing types, excepting that two opposite sides of "each piece are inclined to each other. When built up, the said "pieces or types form a hollow cylinder, the small end of each "piece carrying a pattern or portion of the design."

[Printed, 7*d.*]

A.D. 1857, September 21.—N° 2449.

ABSTERDAM, John.—"A certain new and useful improvement "in electric telegraphic cables."

This invention "consists in an electric telegraph cable made so "as practically to be elastic lengthwise, such cable or the metallic "parts thereof being constructed with corrugations or flexures "such as will enable the cable, when subjected to a longitudinal "strain, to have an elastic property such as will permit it to extend "under such force or strain."

The improved cable consists of a central "circuit wire or strand" surrounded by "an insulating covering of gutta percha or other "suitable flexible material," over which covering is wound a metallic covering "formed of twisted strands of steel wire in the "usual way;" "these strands may be covered by gutta percha or "tarred hemp." The peculiarity of this invention is that the wires or strands used in the construction of the cable are corrugated either along their whole length or at intervals, the non-metallic protective coverings being formed of an elastic material capable of stretching lengthwise in an equal or greater degree than "the circuit or covering wires;" to corrugate the wires or strands, they are drawn through guides and between corrugating rollers.

As the cable passes out of the paying-out vessel it is delivered into the sea from a pair of corrugating rollers, and thus has

flexures formed along its whole length, which enable it to take a uniform bearing along the surface of the bottom of the sea. The two corrugating rollers are placed upon a sliding frame connected by a cord passing over a pulley to a piston which moves air-tight in a cylinder open only at one end; this air-spring arrangement prevents "the cable from being ruptured by the undulatory move-" ments of the vessel."

The above-described cable can be used "for various other " purposes."

[Printed, 10*d*.]

A.D. 1857, September 22.—N° 2453.

THEILER, MEINRAD (*a communication from Franz Theiler*).— " A direct printing telegraph without relais" [relay?] "and local " battery."

The general arrangement of this apparatus is somewhat like that of the Morse telegraph, instead, however, of bringing the style down to mark the paper strip by the attraction of an electro-magnet, " the writing lever is acted upon by mechanical power of the wheel-" work." The peculiarity of this invention "consists in the appli-" cation of a mechanical resistance to a wheel lever or other part " of the mechanism moving at a sufficient velocity," so as to cause " the axle of a wheel or lever which is fitted in the writing lever " to make a particular movement in the direction of the writing " lever, besides the general one round its axis;" the said mechanical resistance is applied by means of an electro-magnet or electro-magnets in the line-wire circuit. "When the resistance is " removed the lever falls back again."

In one arrangement, the same wheel that drives the flier also drives the pinion which has one of its bearings in the writing lever. The lever armature creates a tendency in this pinion to stop revolving (and therefore obliges it to cause the lever to mark the paper), by bringing a revolving arm up against a fixed disc; the said arm is on a shaft rotated by a wheel which turns with friction on the pinion's axis. In a modification of this plan the tail of the lever armature is pressed against a "plain wheel," instead of using the revolving arm and fixed disc.

In another arrangement the writing lever's pinion is not driven by the same wheel that drives the flier, but by a wheel that turns

with friction on the same axis; this wheel drives another pinion as well as the writing lever's pinion. Two wheels (one on each of the pinion's axes) drive "worms," "and so give motion to two plain "wheels," between which the tail of the lever armature works," and "stops either one or the other" of the said plain wheels," accord-"ing to the direction in which the current is passing through the "electro-magnets." A mark is made each time the "plain wheel" in connection with the axis of the writing lever's pinion is stopped. In place of the "plain wheels," "flies may be employed," "so as "to produce a dead stop in place of a stop by friction."

[Printed, 1*s*.]

A.D. 1857, September 23.—N° 2467.

DE LA HAYE, JOHN, and BLOOM, MARK.—(*Provisional Protection only.*) "Improvements in laying down submarine" [electric?] "telegraphs."

The cable to be submerged is rendered buoyant "by means of "an external covering of cotton or other light suitable substance "enclosed in strips of calico" or other suitable substance, "each "strip to cover only one-half of the circumference of the cable, "so that the covering will be divided longitudinally in two sec-"tions, the quantity of buoyant substance used to be such as to "render the cable about one-sixth heavier than water, bulk for "bulk."

This covering is fastened temporarily to the cable "by glue "or gelatinous or glutinous material soluble in the water." "The strips of calico in which the buoyant substance is enclosed" are rendered "temporarily waterproof by coating them over with "the above gelatinous or glutinous substance."

"On being payed off from the ship, the cable floats on the sur-"face of the water or sinks slowly beneath the waves, but it is thus "rendered too buoyant to allow of its sinking to great depths; "but when the ship has advanced a considerable distance, the glue "around the submerged portion of the cable is acted on by the "water and gradually dissolves. The external covering separates "itself from the cable, and the former being light rises to the "surface, while the latter sinks below."

"The strength of the glue used for connecting the external cover-"ing to the cable is regulated according to the time required to "keep it afloat."

[Printed, 3*d*.]

A.D. 1857, September 24.—N° 2473.

PATTERSON, ABRAHAM BOOTH.—(*Provisional Protection only.*) "An improved mode of laying submarine" [electric telegraph?] "cables."

The object of this invention "is to lessen the risk of breaking "in laying down submarine cables by relieving the strains incident "to sudden changes of velocity in paying out the cable, and to "the rise and fall of the vessel in a heavy sea."

For this purpose the cable is passed "through a float or buoy of "peculiar construction," and payed out "over a beam arranged "to vibrate like a scale beam round a fulcrum, and having the "amount of its motion controlled by a spring or springs attached "in any suitable position & manner."

"The buoy floats upon the surface of the water, and is attached "to the stern of the vessel by a chain or cord; it will assist in "compensating any variations of strain by becoming more or less "submerged, and by changing its distance from the ship."

Any number of floats and beams "that experience may prove "to be necessary" may be used.

[Printed, 3d.]

A.D. 1857, September 29.—N° 2506.

NEWTON, WILLIAM EDWARD (*a communication*).—"Improved "apparatus for igniting gas or other lamps" by means of electricity.

The object of this invention "is to light a gas or other burner "for the purpose of illumination by a current of electricity, in "such a manner that after ignition has been produced the con- "ductor of electricity shall not be exposed to the injurious effects "of the flame."

The invention "consists in effecting this by combining with a "gas or other burner or burners a vibrating electric conductor, "which shall pass in close proximity with gas to be ignited, and "after producing ignition pass off beyond the reach of the flame;" the invention "also consists in letting on and shutting off the "gas from a burner or burners by the motive power of an electro- "magnet combined with a suitable valve or equivalent device for "opening and closing the aperture or apertures through which "the gas is supplied in combination with a vibrating electric "conductor."

"The igniting wires are connected with a lever having an arma-
" ture at the other end, and which is worked by an electro-magnet,
" whereby the wires are drawn forward when required to ignite the
" gas, but immediately the electric current is broken the wires will
" be pushed out of the flame by means of a suitable spring. The
" gas is also turned on to the burner by means of the same arma-
" ture and lever, which is made to act on and drive round a ratchet
" wheel connected with the cock or valve, and by that means let
" on the gas."

In the apparatus shown in the Drawings, the gas is let on and turned off by means of a cap carrying the burner, and having holes which fit other holes on the top of the gas pipe in one position, this cap also at its lower end carries the ratchet wheel.

One battery is used to turn the gas on or off, and another (put into action by the deflection of the lever armature) to ignite the "platina" wire.

The ratchet-wheel mechanism enables the size of the gas flame to be graduated, three or more actions of the pall being necessary to perfectly open or close the cock.

Other methods of carrying out this invention are mentioned.

[Printed, 7*d.*]

A.D. 1857, October 14.—N° 2628.

HOLMES, Frederick Hale.—" Improvements in magneto-
" electric machines."

This invention "relates to a peculiar construction and arrange-
" ment of rotatory magneto-electric machines, whereby a maximum
" amount of electricity can be obtained at a low speed of working,
" thus avoiding the injurious consequences attendant on working
" at a high velocity."

A "small direct-action steam engine" drives the shaft of the helix wheels at a moderate velocity by means of a crank at the extremity of the said shaft, each helix wheel being between two fixed frames carrying permanent magnets whose poles are in the circumference of a circle and radiate outwards. "The circles of
" magnets and helices are so disposed that the latter revolve
" between the opposite poles of opposite fixed magnets." In the machine described and shown, "the numbers of the poles of the
" helices are double the number of poles of the magnets;" the

various currents are collected by two commutator wheels, acting according to the plan set forth in the Specification of Letters Patent, N° 1998 (1857).

The helices are fixed within the brass trough or "hollow rim" of their wheels, by passing their cores through the sides of the rim and hollow core, and screwing the said iron cores into the said rim.

The rim carries a slightly projecting fillet, which prevents the cores from coming into contact with the magnets; and to prevent accident from such contact, the ends of the cores are slightly bevelled off, "by which means they may be safely worked in the " closest proximity to the magnets."

The journals of the main shaft "and other working parts of " magneto-electric machines" have "duplex conical bearings."

The magnets are arranged upon iron frames, and are shoed with soft iron, to enable the whole of the magnets in a frame, when fixed, to be turned in a lathe, so that the faces which they present to the ends of the helix cores may form a true plane.

[Printed, 11*d*.]

A.D. 1857, October 15.—N° 2638.

PRIESTLEY, Frederick.—(*Provisional Protection only.*) "Im- " provements in signal instruments or apparatus for making or " transmitting electric telegraphic signals."

This invention relates to finger keys for forming the compound signals that are required to transmit alphabetical characters in needle and other telegraphs.

On the depression of a key, the bent end of a piece of wire connected to the inner arm of the key lever, passes over a surface composed of conducting and non-conducting portions, and thus makes suitable battery connection, and transmits the compound signal accordingly. The conducting portions of the surface are rivetted to a plate at the back "in connection with the battery," and the wire is "also in connection with the same." There is one key to each letter or character.

[Printed, 5*d*.]

A.D. 1857, October 16.—N° 2654.

CHADWICK, James.—(*Provisional Protection only.*) "Improve- " ments in rollers or cylinders for printing or staining the surfaces

" of woven fabrics, yarns, paper, and other materials," consisting of:—

1st. Employing "the ordinary copper, iron, wood, composition, " or metallic roller," with certain alterations, to give the impression.

2nd. Engraving a suitable roller in the ordinary manner, and " electro-plating" the said roller. "A roller or cylinder of the " required dimensions, whether made of iron, copper, lead, brass, " steel, wood, composition, or other material," is engraved or etched "as for ordinary printing rollers," and polished " ready for " use;" it is then "put into a bath supplied with a solution of " copper, lead, tin, or other suitable material," and a galvanic battery applied to it, by which it is electro-plated.

[Printed, 3d.]

A.D. 1857, October 19.—N° 2676.

GARVEY, Benjamin.—(*Provisional Protection only.*) " Im" provements in apparatus for determining position and direction " on land and sea."

The apparatus consists of "a continuously revolving wheel, so " mounted that it is free to continue its rotation in planes parallel " to that in which it was first set, to revolve irrespective of the " motion of the earth, or any disturbing cause, thereby obtaining " a normal plane or base for use in determining position or " direction on land or sea, for the purposes of navigation, geodesy, " or astronomy."

"A wheel of suitable size, shape, and weight" is sustained "on " a hollow shaft, and said hollow shaft is supported by hollow " gimballs, rings, or universal joints, in such a manner as to pro" duce as little friction as possible, and so that the said wheel is " free to revolve unobstructedly and independent of the position " assumed by the gimballs or frame supporting it." "The afore" said wheel may be made to revolve horizontally by suspending " it on a vertical pipe from the gimballs."

"The revolving body herein termed a wheel may be a revolving " mass of matter of any desired shape, size, or material, and the " same *may be revolved by electricity*, or any suitable source of " motion, and be connected with any desired indicating apparatus."

[Printed, 3d.]

A.D. 1857, October 23.—N° 2702.

BLAKELY, Alexander Theophilus.—(*Provisional Protection only.*) "Improvements in laying submarine" [electric?] "tele-" graphic cables."

This invention "consists in attaching to submarine telegraphic " cables boards or other suitable resisting surfaces, in such " manner that they shall be perpendicular or nearly so to the " cable as the latter sinks;" "these boards or surfaces" are attached "to the cable as it leaves the ship. They should be made " of such specific gravity (by binding them with iron, or other- " wise) that they shall not act as buoys to the cable."

"A suitable method of attaching these boards to the cable is by " means of pairs of jointed rods, one extremity of each of which " nips the cable between suitable curved plates or otherwise, while " the other extremity carries the boards;" other methods of connecting the boards may be adopted.

"The resisting surfaces may be of such extent that they will " receive either the whole or any suitable part only of the strain " which results from the sinking of the cable, and which has " hitherto been counteracted by friction applied on board the ship " from which the cable is laid."

[Printed, 3*d*.]

A.D. 1857, October 24.—N° 2705.

KIRKMAN, Felton Charles.—(*Provisional Protection only.*) " Improvements in machinery for winding and unwinding ropes " and cables, which is applicable to electric cables for submarine " purposes."

This invention "consists in winding on to a vertical rotating " drum and base a rope or cable, and the unwinding the same " free from kinks or snares, ensuring an equal delivery at all times " of the paying out from the vessel or ship."

The following description refers "to the winding or unwinding " a wire rope or cable (similar to the transatlantic telegraph rope or " cable) from and on shipboard."

There is securely placed "in the hold or other part of the vessel " a vertical drum or core attached to a base or rotating flooring, " on which the rope or cable is to be wound, which process may " be accomplished by means of a rack-and-wheel motion geared " to the platform, and fixed in such a convenient position as to

"give a free and easy winding or rotary motion to the platform "and drum or core on which the cable is to be wound; the "machinery to be worked by steam power or otherwise, and to "be provided with a break or breaks to check the speed of wind-"ing or unwinding when found necessary."

"This portion of the process being accomplished, the winding "machinery may be thrown out of gear, and the end of the rope "or cable passed over a loose pulley or sheave to regulate "its delivery to a second drum or capstan, round which one, "two, or three, or more bends, as the case may be, are to be "made. This drum or capstan to be caused to rotate by means "of wheel motion, or gearing worked by steam power, or other-"wise, and provided with breaks to regulate its motion, thereby "causing a regular and equal strain upon the rope or cable, and "at the same time securing an equal delivery from the first drum "and moveable platform, upon which the rope or cable is first "wound."

[Printed, 3*d*.]

A.D. 1857, October 24.—N° 2707.

MACINTOSH, JOHN.—"Improvements in the construction and "laying of" [electric ?] "telegraphic cables."

In constructing telegraphic cables the insulated conducting wire has "the bat or fleece from a carding engine" folded round it, or in other ways it is surrounded "with fibres laid parallel "to its length." The said fibres are crushed "into the coating "of gutta percha or other insulating material while it is still in "a soft state;" a further coating of insulating matter (in which iron filings may be mixed) may be given. To apply the bat or fleece as it comes from the revolving tube of a carding engine, it is passed between a pair of rollers, which crush it into a ribbon equal in width to the circumference of the coated wire round which it is to be lapped; the bat or fleece is then wound upon a bobbin which is "mounted on the frame of the covering machine, "and as the conducting wire" "issues from the covering machine "it passes through" two concentric guide rings placed on the wire, by which means it is bent over the wire, so that the crushing rollers can compress it into the coating of the wire. In employing "yarns" instead of the bat or fleece, a single ring, with small holes in it, is used instead of the double ring.

In laying telegraphic cables, the cable, "when it is clear of the "ship," is passed over a pulley suspended "from the gaff or "other spar or spars by long springs of vulcanized india-rubber," thus compensating for the pitching of the vessel. To assist the compensating action of the springs, a float or spar, about the specific gravity of water, is suspended from the pulley, the said float being attached to the vessel, and so bridled as only to be capable of vertical motion. "A metal or other basket" containing water, or "a long tube having a piston operating on the deliver-"ing sheave" may be employed instead of the float or spar.

[Printed, 4d.]

A.D. 1857, October 28.—N° 2727.

ADDISON, JOHN.—This invention relates to "discovering and "destroying hydrogen or carburetted hydrogen gas and other "gases in coal mines, dwelling houses, or other places."

The Complete Specification describes the invention under the following heads:—

1st. Detecting hydrogen or carburetted hydrogen gas in a mine by means of hydrogen balloons.

2nd. Detecting hydrogen or carburetted hydrogen gas in dwelling houses by means of a hydrogen balloon.

3rd. Detecting hydrogen or carburetted hydrogen gas in ships by means of a hydrogen balloon.

4th. Destroying the gas "when its presence is discovered by "burning or exploding it."

According to one method, "an electric spark (with or without "the aid of gunpowder) from a voltaic battery" is used. The gunpowder is placed on a telescope stand, so as to be as high as the noxious gas.

According to a second method, "by means of an electric spark, "with the aid, if necessary, of gunpowder," a rocket is set fire to, "which is made to sweep while burning from one end of the "working to the other." The rocket is attached by two rings to a horizontal wire, and the force of the explosion impels it along the wire, thus enabling it to set fire to any inflammable gas it encounters.

5th. A ventilated "chamber or stable" is constructed, having a sheet iron door. This chamber is to contain the battery, and forms a refuge for men, horses, &c., during explosions,

6th. Detecting "the presence of carbonic acid gas by throwing
" upon the ground a balloon inflated with oxygen gas or atmo-
" spheric air."

The 3rd head is not mentioned in the Provisional Specification.

[Printed, 4d.]

A.D. 1857, October 28.—N° 2744.

GREENING, William.—" Improvements in enamelling and
" ornamenting metals and other surfaces."

The principal features of this invention are as follows :—

The invention "relates to an improved system or mode of
" enamelling metal or other surfaces capable of taking enamel and
" of standing a great heat, whereby a better surface is produced,
" and one which is capable of resisting the action of acids and heat
" and cold."

The acids are extracted from the colors by passing them
" through lime water or other alkaline solution."

"If a marbling effect is desired," the colors are floated on water, and the water is agitated so as to mingle the colors by means of a galvanic battery; "the surface to be enamelled is laid
" gently upon the surface of the floating colors, when the film of
" color floating on the water becomes transferred on to it, and
" the whole is immediately placed in the enamelling furnace,"
and subjected to heat for a certain period. "The enamelled
" surface is afterwards varnished, polished, and reburnt in the
" ordinary manner."

"A marbling or further ornamenting effect" is also obtained by adding to the colors used, different metals "in the form of fine
" dust, filings, or their foil." In this case the specific gravity of the water is increased by the addition of potash, chloride of sodium, or other non-acid agent.

[Printed, 3d.]

A.D. 1857, November 3.—N° 2787.

HOGA, Stanislas.—(*Provisional Protection only*). " Improve-
" ments in electric telegraphs."

This invention enables "two communicants to convey intelli-
" gence to two recipients at the same moment without any danger

" of the messages or telegrams being intermingled," by means of a " single wire only." " Where two wires are used four messages " may " " be sent and received momentarily, and so on, so that by " each continuous wire the number of telegraphic communications " will in a given time be doubled."

" Two batteries are arranged at each of the two stations, and " one continuous wire connected with the four batteries by being " at each station in contact with two equal poles of the two " batteries, namely, at one station with the two positive poles, and " at the other with the two negative poles. The other two poles " of the batteries at each station are connected with two wires, " each several hundred feet long, which being drawn out in " opposite directions terminate with two large metallic plates placed " in the ground." The four earth-plates are " so situated as to " form a parallelogram on the globe."

" The two persons at one station receiving a signal that two " different messages will be sent to them, detach their two batteries " from all connection with the telegraph, bringing in contact only " the wires of the two plates in the ground with the one continuous " wire and the other telegraph instrument." According to this arrangement the two recipients receive separate signals, one from one communicant, the other from the second communicant, as each communicant operates with a battery in a circuit of its own, except that portion of each circuit which traverses the line wire, the line wire being common to both circuits. As the electric current takes the shortest road it can, the two circuits work separately, each from its own earth-plates, and do not proce diagonally so as to interfere with the earth-plates of each other's circuit.

The signals must be produced by making and breaking the electric circuit, and not by " reversing the current."

[Printed, 3*d*.]

A.D. 1857, November 4.—N° 2799.

HIGGINSON, Francis.—(*Provisional Protection only.*) This invention relates to laying down submarine electric telegraph cables.

It is proposed to use an " ordinary iron chain cable " as an auxiliary cable in laying down electric telegraph cables, the said auxiliary cable to be paid out at the same time as the telegraph

cable, and fastened to it, as it is paid out, by metallic chain or otherwise.

The advantages arising from the use of the auxiliary cable are, that it bears all important strains, and by its weight causes the telegraph cable to descend close to the stern of the paying-out vessel; it is also said to cause "an increase of electrical power in "such telegraph cables so conjoined."

The two cables are separately coiled, and are delivered from a hatchway "about or near amidships." The apparatus on deck consists of "an auxiliary small engine to heave in and pay out "cable," a brake drum for the telegraph cable, a strong brake apparatus, "in combination with several strong iron lever com-"presses and retarding nippers and stoppers, placed along the "decks at intervals between the hatchway and bitts herein-after "mentioned," for paying out the chain cable, and "two very "strong bitts," halfway between the hatchway and the stern, for bringing the electrical and auxiliary cables together. After the cables have passed the bitts, a number of seamen rapidly pass short chains round both cables, "a few experienced men at "intervals" passing nippers of "laid iron" "in the manner "formerly practised, 'thick and dry,' whilst weighing with hemp "cables."

It is proposed by the above-described arrangements to lay down "transatlantic telegraph cables between England and America, "by way of the Azores, or other more distant points and places."
[Printed, 3*d*.]

A.D. 1857, November 9.—N° 2829.

BALESTRINI, Pier Alberto.—(*Provisional Protection only.*)
"Improvements in machinery and apparatus for paying-out "submarine" [electric?] "telegraph cables, and for regulating "and controlling the paying-out thereof."

The "main machine consists of a drum, levers, grooved pulley, "and springs. The lever or levers are fixed or connected at one "end to the axis of the drum, which forms the axis of oscillation "of the lever or levers." The bearings of the grooved pulley "are free to slide up and down in guides" at the opposite end of the levers, the said bearings or "plummer blocks" being supported on the levers by springs. The levers themselves rest on springs near the drum, as on fulcra.

"The cable is brought from the hold and passed once, twice, or "more round the drum, then over the grooved pulley into the "water." On the tension of the cable a yielding medium is thus provided, which will resume its normal position as soon as the strain is removed, for any extra strain causes the depression of the grooved pulley and of the levers; and on the removal of the extra strain, "the levers and grooved pulley rise and resume the "positions from which the strain drew or depressed them."

Instead of the above-described arrangement, "the levers them-"selves may be formed" "so as to act as springs," the ends of which nearest the drum would then be fixed.

The rotation of the drum may be controlled by a shaft having paddles which "revolve wholly or partially in water or air."

Brakes and indicating dials are used in connection with the above-described machinery.

[Printed, 8d.]

A.D. 1857, November 10.—N° 2841.

WAY, John Thomas.—"Improvements in obtaining light by "electricity."

One part of this invention "consists in so arranging the char-"coal or other conducting substance forming the solid electrode, "that it shall be continually renewed and presented to the stream "of the flowing electrode at a constant distance from the orifice "of the jet from which the latter issues." According to one method of carrying out this part of the invention, rods of "char-"coal" are arranged "opposite to each other," and are pressed together "by springs, or other convenient mechanism," or by a column of mercury; the point of junction of the ends of the rods is "fixed at the focal distance or breaking points of the stream" of mercury or other flowing electrode. Instead of pressing rods of charcoal against each other, "one such rod may be pressed "against a piece of lime" or other infusible material, "the "flowing electrode being directed against the point of junction." In a second method, a charcoal rod or cylinder is made to revolve on a fixed axis on which a screw is cut, thus giving the charcoal electrode a lateral as well as a revolving motion, and enabling it to present a fresh surface constantly to the flowing electrode. In a third method, the "charcoal" electrode is projected by a spring

"through a ring of iridium" as its end is consumed, in a similar manner to the action of "a Palmer's candle lamp."

Another part of this invention "consists in heating the material "forming the flowing electrode before it is supplied to the jets." This is done by means of a lamp under the cistern.

Another part of this invention "consists in adjusting the focal "distance or breaking point of the flowing electrode, by in-"creasing or diminishing the pressure which causes it to issue "from the jet." For this purpose the cistern is connected with the jet "by means of jointed iron or flexible tubes," and the cistern is suspended from a standard by means of a cord and pulley.

Another part of this invention "consists in a method of main-"taining at a constant height above the jet the column of "mercury or other flowing electrode." For this purpose "a "close cistern" is employed "in conjunction with the open cistern "from which the mercury flows;" a pipe from the close cistern "dips slightly below the surface of the mercury in the open "cistern; so soon therefore as the level of the mercury in the "lower cistern is reduced, the mercury will flow from the upper "cistern, so that the pressure of mercury remains practically "constant."

"Any arrangement by which current electricity is obtained," "is equally applicable to this form of light."

The Patentee's former Patents are alluded to.

[Printed, 9d.]

A.D. 1857, November 14.—N° 2866.

MACINTOSH, John.—"An improvement in preparing telegra-"phic wire which is coated with gutta percha in order to render "it more capable of resisting heat, and in laying down telegraph "wires in the sea."

Gutta-percha-covered electric telegraph wire is made capable of resisting heat, either by subjecting it "to the action of sulphuric "acid on its surface, and then to water, or to the action of "chloride of sulphur and a solvent."

"In submerging telegraphic cables," "the rate of delivery "from the coil" is kept "approximately uniform without risk "of crushing the soft core of gutta percha, injuring the electrical

" condition of the conducting wire, or dangerously increasing the " strain on the cable." "The cable passes more or less freely" through "a series of friction holders," the said friction holders being "elastic in themselves," and "attached to the vessel or ap- " paratus carried thereby by vulcanized india-rubber connections." The elastic holder preferred consists of one box inverted within the other, the inner box being weighted so as to cause wooden balls with which it is filled to press against the cable; the cable passes through steel bushes in the ends of the boxes, and the boxes contain water to prevent over heating. The effect of this arrangement is, that as the cable runs out, each "friction holder" offers a certain amount of resistance to its passage; if the speed of the cable increases to any considerable amount, the friction holders grasp the cable more strongly, and are drawn forward by the yielding of their vulcanized India-rubber connections. A cord passing over a pulley is attached to the inner box, and, by means of a spring, counteracts the effects of a sudden strain on the cable. A "friction holder" is placed beyond "the delivery pulley;" this consists of "a tube of strong canvass," bound to steel rings and filled with balls of hard wood, the whole being enclosed in a case and towed by the ship.

[Printed, 4*d*.]

A.D. 1857, November 14.—N° 2868.

HENRY, MICHAEL (*a communication*).—"Improvements in " electric and galvanic conductors, and in the mode of and " machinery or apparatus for manufacturing the same."

The "improved conductor" "consists of wire insulated by a " covering of gutta percha or india-rubber, firmly enclosed in a " coating of lead or other ductile metal."

The "new process" consists in interposing between the cold gum of the insulated wire and the hot lead in the lead chamber (during the process of covering the insulated wire with lead) an annular space, through which cold water is kept constantly flowing, "thus securing a proper relative temperature of the hot metal " and cold gum" "while they are moving toward, and by the " time they reach, the point of union."

"The whole machine used consists essentially of a tube through " which the insulated wire passes; a second tube surrounding the

" first, and forming an annular ring or space between the two for " the circulation of fluid; a hollow point at the end of the last- " mentioned tube, of a calibre of such size that the insulated wire " being coated with gutta percha or india-rubber will pass freely " but closely through it; a plunger fitting the lead chamber, and " with a hole in it to receive the outer tube; and a lead chamber " with a hopper to receive the lead; a die into which the point of " the outer tube just enters, leaving sufficient space it around it " to allow the lead to pass into the die and around the gum; an " inlet and outlet at the end of the tubes opposite to that of the " die for admission and emission of the current of fluid; and all " supported by a suitable framework, and connected with a " hydraulic press." The piston of the hydraulic press is "at- " tached to the lead chamber plunger," and has "an orifice " through it for the tubes to pass through," "the parts being " suitably packed."

The insulated wire being introduced through the inner tube and die, the melted metal, forced by the plunger out of its chamber through the die, "closes around the wire with sufficient impinge- " ment to draw it down." "The wire as it comes from the die " should be received in cold water, or otherwise thoroughly cooled " as fast as formed."

[Printed, 7*d*.]

A.D. 1857, November 17.—N° 2877.

FIELD, THOMAS.—(*Provisional Protection only.*) "A new me- " thod or mode of and appliances for submerging submarine" [electric ?] " telegraph cables."

This invention "consists in sinking or submerging submarine " telegraph cables and guiding them to those parts of the bed of " the ocean where it is desired to deposit them by aid and " means of a long and strong flexable tubular cable with a number " of weights attached thereto."

The flexible tubular cable is represented in the Drawing as extending from the "paying-out ship" for a considerable distance. " The submarine telegraph cable in being paid out (or delivered) " from the paying-out ship," "has to pass through the core of " the flexable tubular cable," "and in its descent to the bed of

"the ocean it is shielded and protected from the currents of the "ocean by the aforesaid flexable tubular cable."

"The aforesaid tubular cable" is made of "iron and steel "wires, or of iron or steel band coiled into the shape of a tube "by the process patented by Daniel Davidge, or of leather or "of any other suitable materials." "When extra strength is "required in the flexable tubular cable," "2 or more flexable "tubular cables" are used, "one outside the other."

[Printed, 5d.]

A.D. 1857, November 19.—N° 2907.

GOEDICKE, Reinhold.—(*Provisional Protection only.*) This invention relates to "the suspending of the lines of electric tele- "graphs in the air by means of gas balloons across water and land, "or the atmospheric telegraph."

The following points, relating to the practicability of the invention, are defined:—

1st. "By what means can balloons be kept continually suspended "in the higher regions of the air?"

The balloons, having been filled with a light gas, are allowed to ascend. In order that they may "continually be kept suspended "at a certain height," they are presumed to have been closed air- "proof on all sides" after having been filled with gas. The balloons are to be suspended at an equal height "by filling them all "with the same kind of gas of a fixed specific density."

2nd. "How and in what manner can they be fixed?"

"The balloons are attached to the conducting wires at fixed "distances" by means of metal cramps "enclosed in an en- "chasing of porcelain or any other isolating" [insulating?] "sub- "stance." The conducting wires pass through the porcelain, and are attached in such a manner that the balloon remains at the same place of the conducting wire.

3rd. "At what heights are the balloons to be suspended?"

It is proposed to suspend them as high in the air as possible.

4th. "How is such a telegraphic line to be constructed?"

The required number of balloons is filled; one end of the conducting wire is fixed; and at a suitable distance along the wire from the fixed point a balloon is fixed and allowed to ascend. The other end of the conducting wire is turned in the direction the telegraph is to be laid, and balloons successively attached to it at suitable

distances apart, and allowed to ascend; no balloon to be attached until the previous ones have ascended.

On arriving at the end of the telegraphic line, the conducting wire is drawn tight "by means of a pully, in order to prevent too "strong a vacillation, and also to prevent the different balloons "from the approach to much."

It may possibly be found "better to fix at each telegraphic line "only one very large balloon," in which the hydrogen gas can be renewed from time to time by means of a gutta percha tube.

5th. "Is it possible to repair such telegraphic line above the ocean "in case one or several of such balloons should get damaged?"

It is proposed to attach to each balloon a small life-boat, intended to keep the conducting wire above water "till the damaged balloon "has been replaced by a new one."

[Printed, 3*d*.]

A.D. 1857, November 21.—N° 2923.

GLOVER, Thomas, and BAIN, Alexander.—"Improvements "in electric telegraphs," combining "the principles and advan-"tages both of a signal and a recording telegraph."

In the arrangement described and shown, the receiving apparatus consists of a pen mounted at the end of the lever armature of the receiving electro-magnet, a reservoir with a piece of cotton and tube to convey water or other fluid to the pen, and an endless vulcanized India-rubber band to which "progressive motion" is given "by a train of wheelwork" set in motion by a spring barrel. When the electro-magnet is excited by the passage of an electric current, the pen makes a mark on the India-rubber band, the said mark being of a greater or less length according to the duration of the current from the transmitting station, thus enabling signals to be made on the band which last for a sufficient time to be read before they are obliterated by evaporation or by rubbers.

If "the indications are desired to be preserved," "coloring "fluid" may be used instead of water, or "a chemical (as for "instance, a solution of potash) may be employed to discharge "color from blue or other colored paper or material, upon which "it is delivered." In this case a "creel" carrying a strip of paper is mounted on the frame of the receiving instrument, and the color or chemical is transferred from the India-rubber band to the paper by the pressure of a roller.

The method by which it is preferred to work the telegraph, when the above-described arrangement is used, is to have only one battery in an extended circuit, and to use a spring key for transmitting signals which always preserves the circuit closed except whilst signals are being made.

[Printed, 1s. 10d.]

A.D. 1857, December 1.—N° 2985.

LANE, DENNY.—" Improvements in lighting, regulating, and " extinguishing street and other gas lamps by means of electricity," consisting of:—

1st. " Lighting gas lamps by electricity." A portable battery is carried from lamp to lamp, and connected to the contact points of a conductor passing to the burner; the gas being turned on " by a " tap placed near the ground," the passage of the electricity ignites it. Either the primary current may heat a platinum wire placed across the gas jet, or " an induced current " from a Ruhmkorff or Hearder's coil may pass a spark between electrodes on opposite sides of the jet.

2nd. " A means of regulating or extinguishing the lights of " street or other gas lamps." On the passage of an electric current through a suitably arranged circuit, the electro-magnet acts on a detent by means of its armature, and releases clockwork connected with the plug of the gas tap. Either the same circuit may be used to actuate the tap as that for lighting the lamp, " or a " separate circuit may be used for that purpose if it is desired to " light the lamps by a conducting wire embracing many lamps " in its circuit."

[Printed, 4d.]

A.D. 1857, December 2.—N° 2987.

SHEPARD, EDWARD CLARENCE.—" Improvements in magneto- " electric machines."

The apparatus consists of a number of helix wheels mounted on one common shaft between frames to which are fixed the permanent magnets. The magnets in each frame are arranged with their poles in the circumference of a circle, and the poles are disposed alternately north and south in the said circumference. The frames are so arranged that at any given moment each helix passes

between and is acted on by a pole of opposite name, a north pole being at one end of the helix and a south pole at the other.

The currents of all the helices are united together to form "one "grand current." Each helix wheel carries two insulated conducting rings for this purpose, each alternate wheel having its rings in connection with the exterior terminal wires of its helices, the intermediate wheels having their rings connected to the interior terminal wires of their helices. Each helix has not its terminal in connection with a ring, it may have its terminals connected to the neighbouring helices, and thus "sets of two, four, or more" helices may be formed, the terminals of each set being connected as described above. A metallic rod connects all the outer rings, and another rod connects all the inner rings, thus transmitting all the induced currents to the "frotteurs" or commutator wheels; one wheel receives the current from one rod and the other from the other rod; springs conduct away the aggregate current from the "frotteur plates," so as to enable it to be applied to the desired purpose, all the currents being then in the same direction.

When a continued current is required for the electric light, the "frotteur" is "formed entirely of a copper or other metallic ring, "to which is attached an eccentric or ring of copper or other "metal."

[Printed, 1*s*. 5*d*.]

A.D. 1857, December 3.—N° 3003.

HENWOOD, Charles.—"An improved arrangement of gal- "vanic battery suitable for medical purposes."

"Plates of copper and zinc or of two other metals, one electro- "positive and the other electro-negative to the other," are combined and arranged in pairs, the pairs are then united "to form "a chain or belt."

A plate of copper is bent at the centre and one half folded down over the other half; "small portions" are cut away "from the fold "or part where one half is doubled over the other." "A plate of "zinc covered with linen or other textile fabric to prevent contact "between the plates," is then placed "between the two halves of "the copper plate." "The zinc plate is equal in breadth to nearly "one half of the breadth of the copper plate; it has two lugs, "which project beyond the parts cut away from the fold in the

" copper plate. The opposite corners to the lugs in the zinc plate " are cut off, and the zinc plate is held between the two halves of the " copper plate by two corners of the latter being turned in under " the zinc plate; the two other corners of the copper plate have " each a hole pierced therein, a hole is also made in the projecting " zinc lugs, and metal rings being passed through the holes in the " zinc lugs and copper corners unite every pair of plates."

The Drawings show " a number of pairs of plates connected " together and fastened to a strap to form a belt for personal wear." A linen case buttons " over the plates to keep them from contact " with the body where desired."

[Printed, 6d.]

A.D. 1857, December 5.—N° 3020.

HENLEY, WILLIAM THOMAS.—" Improvements in ropes and " cables for telegraphic or other purposes, and in machinery " used in the manufacture of such and other ropes and cables."

The cable preferred for submarine electric telegraphs is as follows:—The central core of conducting wires consists of, " say, " six wires" wound " round a core of hemp or other similar " material," each wire being coated with gutta percha. The said central core is " covered with serving of tarred yarn," and then with " strands formed of wire and cocoa-nut fibre, hemp, or other " suitable material; these strands are made by laying threads of " wire and vegetable fibre, or other suitable material into a " strand, having a central thread or core of hemp or other similar " material."

The improvements in machinery for making ropes or cables are as follows:—

In " making the strands or small ropes," " the wire or other " material of which the strand or rope is to be made" is wound on fixed bobbins, from which it passes over a pulley to a fixed " lay plate;" thence the threads pass to a revolving frame, which carries " nipping rollers," a " taking-off pulley," and " receiving " bobbin." The " nipping rollers" in conjunction with the " lay " plate" lay the threads or wires round each other, the " taking- " off pulley" obtains uniform rotation by screw and screw-wheel gear driven by the revolution of the frame, and in proceeding to the " receiving bobbin" an " arm" (worked by a nut and double screw) lays the strand from end to end of the " receiving bobbin"

until it is full; the "receiving bobbin" is driven by the friction of a spring so as to allow it (the bobbin) to slip as it fills with rope, and the laying "arm" is driven from the axis of the "receiving bobbin," therefore at a relative speed.

In making wire ropes, to prevent any wire receiving a twist, the bobbins are so arranged on the "table" or face plate of the "cable "machine" that their axes always retain a given position; for instance, if the face plate is vertical, the bobbin axes are always horizontal. According to one method of effecting this, cranks on the bobbin axes are all attached to a ring or rings, which are kept in the same relative position with respect to the horizontal plane either by gravity or by pullies revolving on axes fixed to the framework. A second method consists of passing a gut or other band round pullies on the bobbin axes and also round a fixed central pulley, all the pullies being of the same diameter. In a third method, a flat chain is used instead of a band, and it is merely passed round the external portions of the peripheries of the pullies, which are toothed in this case; motion is communicated to this arrangement by a chain passing round a fixed central pulley and round a second pulley on one of the bobbin axes.

[Printed, 1s. 4d.]

A.D. 1857, December 5.—N° 3024.

NEWTON, William Edward (*a communication*).—"Certain "improvements in apparatus for laying submarine" [electric ?] "telegraphic cables."

"The object of this invention" "is to retain a constant reserve "of cable between the paying-out apparatus on board the vessel "which carries the cable and the point where the cable leaves the "vessel, and to control such reserve in such a manner that when "there is any tendency to increase the tension of the cable," "a "properly regulated quantity of cable may be allowed to run out "from the reserve, and thus prevent the tension being increased "so suddenly as to break or unduly strain the cable."

The cable is payed out by means of a steam engine, from the portion of the vessel where it is stowed "at a speed never less "than, but properly regulated in proportion to, the speed of the "vessel." The cable passes from the hold over and under a series of drums, connected by spur gear with each other and with the

steam engine or other motive power, one of the drum shafts having secured to it a brake wheel to which a friction brake is applied.

"The apparatus for maintaining a reserve of cable and con-" trolling the paying-out of the same consists of a series of pullies " or drums placed on a shaft that is mounted on a moveable " carriage that runs on a line of rails made nearly the whole " length of the vessel. A similar series of pullies or drums, but " mounted on a fixed frame, is placed at one end of the vessel, " while the moveable frame with its pullies is placed on the rail-" way at the other end. The cable is passed round the pullies or " drums of both frames, and extends in several lengths from one " frame to the other. A retaining weight or other analogous " contrivance is adapted to the moveable frame, so as to keep it " back except when any undue strain is laid on the cable, when " the moveable frame will be drawn forward towards the fixed " frame, dragging with it the retaining weight, and of course " when the extraordinary strain is removed, the moveable frame " will run back again. Intermediate between the two frames is " placed another frame, also provided with pullies or drums, and " is also made to run on the railway, but is merely intended to " support the cable midway between the two principal frames, " and prevent it from bagging. Guide pullies are adapted to the " two principal frames for the purpose of conducting the cable to " the grooves of the pullies or drums. The grooves of the pullies " or drums are supplied with water, and scrapers are also adapted " thereto, for the purpose of scraping off or removing any tar or " other matter that may be deposited thereon by the cable while " passing over or round them."

[Printed, 7*d.*]

A.D. 1857, December 7.—N° 3026.

LAVATER, MANUEL LÉOPOLD JONAS.—(*Provisional Protection refused.*) "Improvements in laying down" [electric?] "telegraph " cables in the sea."

"The cable" [is?] "to be wound ashore upon a floating drum " or cylinder, which cable" [is?] "to be unrolled out at sea by " means of the axles of the drum being fastened by chains to " a steam tug."

" The same means might be used when modified in taking the
" cable out of the sea."

[Printed, 3*d*.]

A.D. 1857, December 12.—N° 3065.

DE NORMANN, JOHN, and HENLEY, WILLIAM THOMAS.—
" Improvements in machinery for preventing the overlapping of
" chains or ropes when used on drums or shafts, which improve-
" ments can be applied to the laying of" [electric?] " telegraphic
" cables."

These " improvements consist of apparatus for enabling a rope
" or chain to be wound on a barrel without one coil riding on
" another. As ordinarily in lapping a rope round a barrel it
" takes a spiral" [helical?] " form, advancing along the barrel
" until it reaches the end, when the coils commence riding or lap-
" ping over the others."

According to one mode of effecting this purpose, a ring is " kept
" in an inclined position to the axis of the drum" by rollers fixed to the framework, the said ring being capable of moving on the drum longitudinally by means of projecting lugs, which work in slots on the periphery of the drum. The inclination of the ring obliges the cable to wind itself on the drum according to the same inclination, and thus in a helix, without overlapping or rubbing against the ring, for the ring revolves with the drum.

A second arrangement consists of two drums, one grooved, the other plain. The cable enters a groove and is crossed to the plain drum, again crossed to the next groove of the grooved drum, and so on, until as many coils are wound on the drums as may be desired; " no furling can take place, as the different laps of
" cable in crossing each other between the drums keep exactly in
" the centre between each other."

In a third arrangement, the cable laps round a large drum, and is compelled to take the screw form by means of a smaller drum having several flanges which work in narrow grooves in the large drum.

[Printed, 1*s*. 2*d*.]

A.D. 1857, December 17.—N° 3101.

HIGHTON, EDWARD.—" Improvements in electric telegraphs."

This invention is comprised under the following heads:—

1st. In " the gold leaf telegraph," patented by " the Revd. Henry " Highton " (See No. 11,070, Old Law), an electro-magnet is used instead of a permanent magnet.

2nd. " Recording signs or indications made by telegraphic " instruments, by means of photography." The deflections of a magnetic needle (or of a perforation in a screen) are registered on moving sensitive paper; " in the magnetic needle or bar a hole " is formed, and by suitable optical apparatus light is concen- " trated at and around this hole, and a portion of it passes through " on to the paper, and marks it, so that the position of the needle " is constantly registered on the paper."

3rd. " Protecting telegraphic wires when buried in the ground." The wires are placed in cast-iron boxes, triangular in cross section, and laid with the apex upwards, so as to glance off the point of a pickaxe or other tool used for repairing roads, &c.

4th. A " code table," to be used by persons having frequent occasion to communicate by telegraph. This table consists of the first fifty powers of 2 (beginning with 2^0 or 1) ranged one under the other. Certain numbers are assigned to each person, and the sender marks on a printed code table the numbers which, added together, make up the number required to be sent. Certain signals are then transmitted, which enables another similar printed sheet at the receiving station to be similarly marked. This method used in combination with books at the receiving station, enables the person to whom the message is sent to be known at the receiving station.

[Printed, 5d.]

A.D. 1857, December 19.—N° 3115.

NEWEY, THOMAS, CORBETT, JOHN, and PARKES, WILLIAM HENRY.—(*Provisional Protection only.*) " A new or improved " method of treating or coating steel pens and penholders, to pre- " vent the oxidation of the same, which method of treating or " coating may also be applied to other articles of iron and " steel."

This invention " consists in preventing the oxidation of steel

" pens, penholders, and other articles of iron or steel, by coating " them with tin by the agency of electricity."

The electro-depositing solution consists (by preference) of an aqueous solution of bitartrate of potash, which is charged with tin by the action of the battery.

[Printed, 3*d*.]

A.D. 1857, December 19.—N° 3120.

BROOMAN, RICHARD ARCHIBALD (*a communication from Jean Marie Joseph Degabriel*).—(*Provisional Protection only.*) " Improvements in signalling, in order to prevent collisions between " trains upon railways."

" The object of this invention is to produce by the aid of electri- " cal apparatuses light in a lamp or lantern supported upon a post " at the side of the line, provided with white and red glasses, and " caused to revolve by clockwork in such manner as to expose " and shew a white light, say two minutes before, and a red light, " or, *vice versâ*, say two minutes after the passage of every train."

" The light is produced from a wick dipping into a spirit reser- " voir in the lantern upon being ignited by an electric spark, and " is extinguished by being brought under a fixed extinguisher " held in the lantern. When one wick is brought under the " extinguisher by the clock movement, another wick is held in " contact with an electric wire to be ignited by the passing of the " next succeeding train."

" The electrical apparatuses may be erected at the side of the line, " when the train would be made to act upon one end of a lever, " and raise or lower it, as the case might be, to open up and " complete the electric circuit between wires held in one end of " the lever leading from the battery and other wires held in a " stationary post leading to the signal lantern; or the electrical " apparatus may be placed between the rails to be acted upon by " the passing trains to complete the electric circuit for the purpose " before described."

[Printed, 3*d*.]

A.D. 1857, December 23.—N° 3147.

LANDI, THOMAS, and FALCONIERI, CHARLES.—" Improve- " ments for laying subaqueous electrical cables for telegraphic " communications."

This invention relates to "the application of floating bodies "and resisting surfaces to assist in the laying of subaqueous "electrical cables;" also to "the application of an indicator or "indicators to show the velocity and tension of the cable."

The floating bodies and resisting surfaces, and the methods of attaching and detaching the same, are as follows:—

A cask has iron hoops and an iron ring attached to it, "to "receive the rope by which it is to be attached to the cable."

A plank has cords attached to it at the angles, the said cords meeting in a single knot, "in order that the plank may always "descend in a horizontal position."

Two discs of wood or iron with central holes are kept at a suitable distance apart on a cord by means of knots.

To attach the float, &c., to the cable, a rope and spring clip are used. The spring clips may either be "pincers," with or without a divided swivel tube to grasp the chain, and with springs or studs that prevent them opening after having been once closed, or spring collars of steel, or "elastic spring hooks," or flexible wooden sticks bent at the ends may be used.

To enable the float, &c., to become detached from the cable, after a time, one of the following means of fastening the rope from the float and that from the cable is used, these means depending upon the solution of a cement by the sea water:—"Two ends of "the rope are untwisted and interwoven, and afterwards sur-"rounded by cotton bands covered with cement." Two ropes forming two eyes are enclosed in an egg-shaped piece of wood by a plug "of plastic material." According to a third arrangement, the piece of wood is in two halves (joined together by screws), "and the pivot is in iron and capable of folding down about a "pin or centre, and thus releasing the rope, when the cement" "which fills the cavity in which it turns, becomes dissolved." In a fourth arrangement, the piece of wood is "hollowed out "conically inside," and one rope "terminates in an iron button "held in the cavity by the cement."

The speed of the paying out of the cable is shown by an "indi-"cator" similar to the governor of a steam engine; the position of the collar upon the graduated stem indicates the speed, the apparatus being connected by bands and pullies to a large cylinder or drum, round which the cable passes several times, on its way from the hold of the vessel to the sea.

"The journals in which the drum works are made slightly "moveable on their supports, and a spring or a lever furnished "with a weight acts constantly on them to keep them in their "places. The displacement of this lever, or spring, or of the journals "being marked on a graduated dial, will furnish the required "indications of the degrees of tension which the cable exerts."

[Printed, 7d.]

A.D. 1857, December 24.—N° 3164.

BURLEIGH, BENJAMIN, and DANCHELL, FREDERICK LUDWIG.—"Certain improvements in the manufacture of vessels, "plates, or utensils used for domestic, sanitary, electric, and "manufacturing purposes."

This invention consists in manufacturing articles for the above-mentioned purposes of "solidified carbon;" amongst the articles specified are "cells, cylinders, plates for batteries, and electrodes "for electro or galvanic purposes."

Carbonaceous matter may alone be taken, or it may be "ren-"dered plastic" by the admixture "of moist bituminous, resinous, "gummy, oleaginous, saccharine, glutinous, or other suitable "cementing medium;" it is then forced into suitable moulds (preferably by the percussive action of a steam hammer), and "baked or burned" in a closed vessel.

To render "objects made of solidified carbon proof against the "action of oxygen when exposed to fire," they are "coated out-"side with silicious" [siliceous?] "glaze," or other suitable substance.

To render articles of solidified carbon capable of retaining fluids or gases, they are coated "with a suitable varnish, lacker, or "glaze."

[Printed, 4d.]

A.D. 1857, December 30.—N° 3189.

MORRISON, JAMES DARSIE.—"Improvements in effecting "surgical and medical operations by the agency of artificially-"induced anæsthesia."

The anæsthesia is produced by means of "a cooled liquid" and "a current of cold air," and various instruments are described and shown for applying these anæsthetical agents in dental and

other surgery. "In order still further to secure the proper "anæsthetical condition, an electric current is or may be brought "from a suitable battery and applied by a wire to the parts under "treatment; and this application may either be made alone or in "conjunction with the artificially produced anæsthesia due to "congelation."

When the above-mentioned instruments are made of a non-oxydizable metal they may be used to convey "a stream of "electricity to the affected part;" "either positive or negative "electricity may be conveyed to or abstracted from the part of "the body under operation."

An "induction coil" may be placed in the above-mentioned instruments, "and have attached to it a delicate galvanometer or "electrometer, so as to transmit and indicate visibly the electric "condition of the part under operation or investigation."

The Patentee states "that electricity is a measureable substance "filling all space, aeriform in its nature, compressible and elastic "without limit, and that heat and light are the properties of "electricity; that electricity itself is a substance, and not as "hitherto considered a mere property of matter; that heat and "light are respectively compressed and expanded electricity; that "the terms positive and negative are synonomously explained by "condensation and rarefaction."

[Printed, 8d.]

APPENDIX.

A.D. 1773, July 30.—N° 1049.

HAAKE, CHRISTIAN WILHEM, Baron VAN.—This invention relates to making a certain composition, which " consists chiefly " of common salt, which is melted in an oven (made for that " purpose) by a large coal fire, until it is dissolved as thin and " fluid as water; then the same is first fixed with saltpetre (*which " receives from the air a magnetic power, and communicates the " same to the fluid*), salt of unslacked lime, and salt of Rhenish " tartar; when the said composition (so invented, found out, and " prepared) becomes of a magnetic quality, whereby it attracts " its fertility, and is (as aforesaid) productive of the effect of " manuring and improving arable land, meadow, and pasture " ground."

[Printed, 3*d.*]

A.D. 1835, July 24.—N° 6866.

DICKINSON, JOHN, and TYERS, WILLIAM LONG.—" Certain " improvements in the manufacture of paper," consisting of:—

1st. " The use of a series of magnets for the purpose of extri- " cating from the pulp of which paper is made, particles of iron " or steel which are found to be mixed up with certain materials " now made use of for the manufacture of paper, and which " ultimately rust and disfigure the sheets of paper in which they " are deposited."

A number of common horseshoe magnets are placed under a shallow trough, through which the pulp is delivered to the machine, the rate of progress of the diluted pulp being " slower than is " generally the case in the supply of paper machines," and the trough having a very thin copper bottom. " Such particles of " iron or steel as may be in the pulp " are, by the above-described

arrangement, caused "to settle on the bottom of the trough, from "whence they may be removed every time that the machine "ceases working."

2nd. "A process for the arrangement of the fibres of linen or "other substance used for the manufacture of paper," in which "a transverse and diagonal deposit of some of the fibres which "form the paper" is effected.

[Printed, 10d. See London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 96.]

A.D. 1845, July 30.—N° 10,793.

PALTRINERI, JOHN.—"Certain new and improved modes of "obtaining and applying motive powers."

This invention consists in "the application of the principle that "all the moving forces in general exist in better conditions to "produce available and useful motion and work when the said "moving forces are applied to the machines, so as to render avail- "able at the same time their force of action and reaction, and to "produce two motions simultaneously."

The applications of the above-described principle are set forth under the following heads:—

1st. A "locomotive with a rotary motion."

2nd. A locomotive with oscillating cylinders.

3rd. A hydraulic turbine or horizontal water wheel.

4th. A "windlass and gin."

5th. "United engines for the navy with two or four cylinders."

6th. Reaction springs.

7th. "The application of the said principle to all voltaic and "induction magnets, which are rendered simultaneously avail- "able, and produce, by attraction and repulsion, pressure and "motion, in the machines to which they are applied."

An electro-magnetic engine is described and shown, in which rotary motion in contrary directions is given to two wheels, mounted concentrically, but "so as to be able to turn independ- "ently" of each other. One wheel carries "iron bars" or armatures, the other, horseshoe "temporary voltaic magnets;" the armatures are parallel to the central axis and the electro-magnets are external to them, but with their cores radiating inwards, so as to enable their polar faces to be a short distance from, but parallel to, the

armatures of the armature wheel. When the electric current excites the electro-magnets in proper order and for a suitable time, the wheels respectively move together, and therefore in opposite directions, by their action and reaction on each other. The opposite motion of the wheels is made to act in one direction by suitable wheelwork.

[Printed, 3s. 11d.]

A.D. 1846, June 29.—N° 11,273.

ANDERSON, Sir James Caleb.—"Certain improvements in "obtaining motive power, and in applying it to propel carriages "and vessels, and to the driving of machinery," consisting of:—

1st. "Certain methods of transfering water to one side of a "wheel, so as to cause that side constantly to preponderate, and "in the application of such wheels" to the above-mentioned purposes.

2nd. "A mode of obtaining pneumatic pressure as an auxiliary "motive power for propelling carriages on railways."

3rd. "An arrangement for a locomotive carriage" [engine?] "for railways and common roads."

4th. "A boiler of an improved construction for furnishing "steam as a motive power."

5th. "A mode of applying motive power to propelling a train "of carriages on common roads."

6th. "A mode of applying steam as a motive power to propel "ploughs."

7th. "The application of the explosive properties of vegetable "fibre, prepared with acids in the manner now used to produce "what is called gun cotton, for the purpose of obtaining motive "power."

An engine is described and shown, consisting of two pistons working in two horizontal cylinders, so that when one piston is at the outer extremity of its cylinder the other is at the bottom of its cylinder; the cylinders have their closed ends abutting, and a valve in the piston enables "the gases generated by the explosion "to escape during the return stroke." The web or woven band is ignited "by an electric spark" from a galvanic battery, the said web being fed by self-acting means. The explosion takes

place in each cylinder when its piston has arrived at the bottom of the said cylinder; the cylinders act alternately, and thus produce rectilinear reciprocating motion.

[Printed, 1s. 4d.]

A.D. 1847, June 15.—N° 11,751.

SYMONS, ALEXANDER.—"Improvements in railway carriages, "in preventing accidents on railways, and in ascertaining the "speed of carriages," part of which improvements relate to the application of electric signals and alarums to a railway train, so that the engine-driver and guard of such train may be enabled to communicate with each other.

These improvements are described under the following heads:—

1st. "An apparatus for preventing carriages running off the "rail."

2nd. "An apparatus for stopping a train in the event of the "breaking of an axle or a wheel coming off."

3rd. "An apparatus to be employed for stopping the engine "when the driver may not be on the engine."

4th. "An apparatus for measuring and counting the speed of "railway carriages."

5th. "A new method of attaching carriages together."

6th. "An apparatus to be employed for preventing or sub-"duing the shocks arising from a collision with railway trains."

7th. "A new method for the preventing accidents, by making "signals between the guards and drivers of a railway train by the "use of whistles and other instruments acted upon by compressed "air."

8th. "A new arrangement for preventing accidents, by affixing "or placing metallic wires or rods, &c. to or on railway carriages, "to be used as parts of a metallic circuit for the transmission of "signals by electricity." The said wires are preferred to be "im-"bedded in a groove or channel cut into the woodwork of the "framing of the carriage," "the wire itself being covered with a "non-conducting material, and the groove or channel in the "woodwork of the framing being covered over or filled in with "narrow plates of metal or slips of wood, or otherwise secured, "so that the wires may be got at, should they require examina-

" tion or alteration." Thus each "carriage carries with it con-" stantly its part of the metallic circuit," viz., two lengths of wire.

9th. An arrangement for connecting and disconnecting the parts of the electric circuit (formed by the lengths of wire described under the 8th head) "throughout a train as carriages are " added to or taken from it." Flexible or elastic pieces of metallic rope, chain, or wire, clasped together "after the manner of a " bracelet clasp," so as to ensure metallic contact, are preferred for this purpose. The elastic lengths may either be attached to the ends of the circuit wire, or they may be in detached pieces or lengths.

10th. Applying a galvanic current "by any of the methods " well known and practised, to actuate and put in motion a bell, " gong, or alarum, and also a needle, pointer, or hand" "placed " immediately in sight of" the engine-driver or guard. The dial over which the needle moves is engraved with suitable signals or communications.

By the above-described means it is proposed to place the entire " management of the train and of the locomotive itself under the " controul and orders of the guard."

11th. "A new kind of buffers for railway carriages, called " 'outer spring buffers,' to be used in addition to and outside of, " or without and in lieu of the buffers ordinarily in use."

12th. "An improved mode of constructing and placing buffer " beams or tubes and rods."

13th. "An arrangement for strengthening the frame of railway " carriages, so as to admit of placing buffer beams, tubes, or rods " on or near the top of a carriage."

14th. "The use and application of buffers at or near the top " of railway carriages."

15th. "An improvement in the mode of connecting railway " carriages with each other, for the purpose of traction or pro-" pulsion of carriages forming a train."

16th. "A new method of securing the tires of wheels of loco-" motives and railway carriages, so as to prevent their flying off " in the event of a fracture."

[This Patent is alluded to in N° 2814 (1855), which see.]

[Printed 2s. 4d.]

A.D. 1852, April 15.—N° 14,060.

SIEMENS, Charles William.—"An improved fluid meter" in which certain applications of electricity and magnetism are or may be employed.

"To prevent galvanic action and corrosion between the different "metals constituting the entire screw drum" used in this meter, it is coated "finally with copper, zinc, or other metal, by means "of a galvanic battery and suitable solution."

The counting apparatus may be "separated from the interior "of the meter without the intervention of a stuffing box or tight-"fitting journal" "by means of a partition plate between two "magnets, or between a magnet and piece of magnetic metal." The uppermost screw drum "carries an upright spindle," "upon "which a steel magnet is mounted. This magnet revolves "closely below a thin copper plate," "which divides the interior "of the meter from the counter. The spindle" "within the "counter carries another steel magnet or bar of iron or other "magnetic metal," "which stands closely opposite the magnet," "and being attracted by the same, follows its rotary movements, "and thence gives motion to the counting apparatus."

[This Patent is alluded to in N° 2828 (1855), which see.]

[Printed, 11*d*. See Mechanics' Magazine, vol. 57, p. 334; and *Practical* Mechanics' Journal, vol. 5, p. 178.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 12.—N° 351.

VITTRANT, Louis Constant Alexandre.—(*Provisional Protection only.*) "Improvements in the preservation of vegetable "and animal matters."

"The object of this invention is to preserve grain, seeds, or "*other* matters by enclosing it or them in a chamber hermetically

"sealed either from light or contact with the atmosphere," except at an opening leading to a "chamber or cellar," "excavated out "of the earth;" by this means all the air that passes into the upper chamber "*having been brought into contact with the earth,* "*will be brought to a proper electrical condition to preserve the* "*grain or other matters stored in the upper chamber.*"

"Another important point is, to divide or separate the grain "into small parcels or thin layers, which are supported upon "shelves with space between them so as to admit of a current of "air passing over or through them."

"In order to cause air from the lower chamber to pass through "the upper one," the latter is exhausted "by means of a wind- "mill, pump, fan, or other exhausting apparatus; the air from "the lower chamber will then pass into and through the upper "one, and be ultimately delivered into the atmosphere."

[Printed, 2½d.]

1853.

A.D. 1853, January 28.—N° 218.

PRIDEAUX, THOMAS SYMES.—"Improvements in the manu- "facture of iron."

This invention consists of "distilling coal in suitable retorts, as "when manufacturing gas for the purposes of illumination, and "conveying the products to reverberatory furnaces employed in "the manufacture of iron, and burning the same with atmo- "spheric air, using suitable storing vessels."

The coke used is prepared as follows:—The water thrown over the glowing coke (after the expulsion of the gaseous products) is impregnated with lime and common salt or carbonate of soda. The Patentee, however, does not confine himself "to the use of "these two alkalies; any substance *electro-positive* or *basic* "towards iron may be employed,—a list which would include "potassium, sodium, barium, strontium, calcium, magnesium, "aluminum, chromium, and manganese. The selection of the

" particular substance to be employed must be determined by " the commercial element of price and the chemical one of " affinity conjointly."

[Printed, 3½d.]

A.D. 1853, March 28.—N° 740.

DERING, George Edward.—" Improvements in preserving or " preventing decomposition in vegetable and animal substances " and matters."

This invention consists of applying " the solutions and matters " resulting *from the working of galvanic batteries*, whether in the " condition in which they came from the battery, or subjected to " some after treatment," to the following purposes :—" Preserving " or preventing decay in timber and most vegetable and animal " matters ;" this is the only application mentioned in the Provisional Specification. " Improving or altering the quality of " fabrics and substances," " preparing them for some after treat- " ment, as in dyeing processes," and " rendering them uninflam- " mable." " Disinfecting and deodorizing fecal and other " matters, in order to prevent the emission of effluvia from them, " and to render them serviceable as manure."

The solution as it comes from the battery generally contains some free acid ; it may either be employed in that state or having the free acid neutralized " by some of the processes described " in the Specification of the Letters Patent for " Improvements in the " manufacture of certain salts and oxides of metals," dated March 28th, 1853.

The solutions preferred for the above-mentioned purposes are those containing sulphate or chloride of zinc. " The various " salts of all the different metals that can be employed as positive " elements in batteries are more or less applicable for the purposes " referred to."

Battery solutions having " generally been considered as refuse, " and thrown away," " the working of galvanic batteries will " become highly remunerative " by the use of this invention, " as " supplying matters fit for consumption on a large scale," for the above-mentioned purposes, " in addition to the ordinary supply of " electrical fluid."

[Printed, 3½d.]

A.D. 1853, September 27.—N° 2215.

CALLAN, Nicholas.—(*A Complete Specification was filed, but the invention did not proceed to the Great Seal.*) "A new mode "of protecting iron of every kind against the action of the "weather, of rain, river, spring, and sea water so that iron thus "protected may be used for roofing, for cisterns, pipes, gutters, "window frames," [*electric?*] "*telegraphic wires*, for marine "and various other purposes."

This invention relates to the coating of iron with an alloy of lead and tin.

The method of coating the iron, after it has been tinned in the usual way, consists of "immersing it (in the same manner "in which iron plates are immersed in tinning them) into melted "lead covered with some fatty or oily substance to prevent oxida- "tion, or into a melted alloy of lead and tin, until the tin on the "surface of the iron combines with the lead or alloy." "When "a thick coating is required, the iron is immersed several times "into the alloy." It is preferred "that the alloy into which the "iron after being tinned is immersed, contain as much lead as "tin, and not more than five or six times as great a weight of "lead as of tin;" but the inventor does not bind himself to these proportions.

[Printed, 2½*d.*]

1854.

A.D. 1854, April 1.—N° 750.

NEWTON, Alfred Vincent (*a communication*).—"Certain "improvements in sewing machinery."

The first part of this invention consists in "the use of magnet- "ism or magnetic attraction, for the purpose of keeping the "shuttle in contact with the face of the shuttle race, without the "use of springs or any other device." The magnetic attraction may be applied "in any form or manner that will control the "shuttle or its action;" but the method preferred is to charge

the iron or steel shuttle race "with magnetism by a common "magnet or otherwise." "The driving of the shuttle is effected "by the traverse of a plate which embraces the ends of the "shuttle."

The 2nd, 3rd, 4th, 5th, and 6th parts of the invention refer to other improvements in sewing machinery which do not involve applications of electricity or magnetism.

[Printed, 1s. 7d.]

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